Mining CONGRESS JOURNAL

THE AMERICAN MINING CONGRESS

JUNE
1947

LINK-BELT PREPARATION and HANDLING MACHINERY at the WORLD'S LARGEST COAL MINE

Coarse coal is hand picked before entering the two Bradford breakers.

American enterprise and technology have scored again. The Robena Mine of H. C. Frick Coke Company, the world's largest coal mine, establishes new standards of production, safety and efficiency.

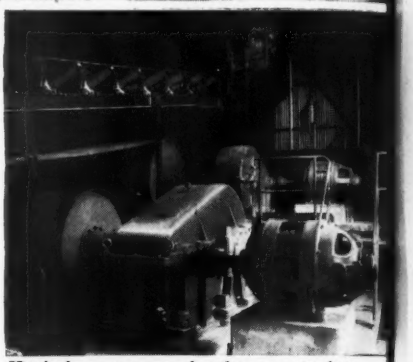
Link-Belt Company is proud to have equipped the Robena mine, as it has many others, completely in all handling, dumping, screening, picking, crushing, blending and barge loading operations. This equipment consists of numerous belt conveyors, including shuttle belt conveyors, motor-propelled tripper, picking tables, balanced type shaker screens, crushers, Bradford breakers, telescoping barge loading chutes with hoists, two ten-mine-car capacity rotary dumpers and steel structures, including an 18,000-ton capacity reinforced concrete blending bin and the 3,000-ton capacity structural steel bin at the river loading station.

Link-Belt offers you a complete line of equipment, broad experience, proved performance and centralized reliable responsibility in all phases of coal handling and preparation.

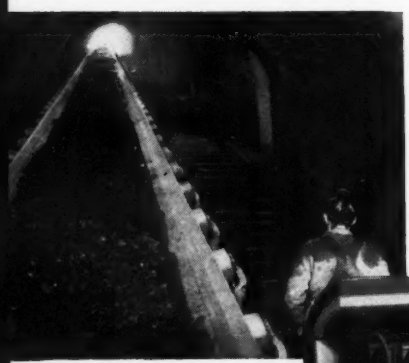
LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8.

10,718

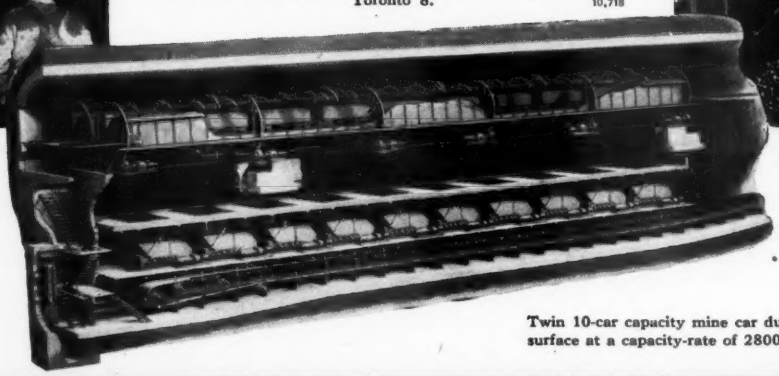


Herringbone gear speed reducer on tandem drive for 60-in. belt conveyor taking coal from transfer house to river tipple.



60-in. wide main slope belt conveyor taking coal out of Robena mine. Conveyor operates at a speed of 600 F.P.M. Total lift from mine bottom is 170 ft.

72-in. wide belt conveyor delivering coal to shuttle belt conveyor which distributes it to the 168 separate pockets which make up the blending bin.



Twin 10-car capacity mine car dumpers unload cars below the surface at a capacity-rate of 2800 tons of ROM coal per hour.

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered, Built and Backed by LINK-BELT

THE SYMBOL OF QUALITY — LINK-BELT COMPANY

For better piping Every Time get Everything from Crane

Power . . . process . . . or general service piping . . . you're off to a good start and good finish on every installation when Crane is your partner. You get everything from one source . . . valves, fittings, pipe, fabricated assemblies, and accessories . . . with the quality you want in every last item. From design to erection, the whole job is simplified.

Plants in every industry gain wide benefits by standardizing on the complete Crane line. It removes any question of piping performance; helps to stabilize maintenance costs. On new installations or replacements, it assures this 3-way advantage:

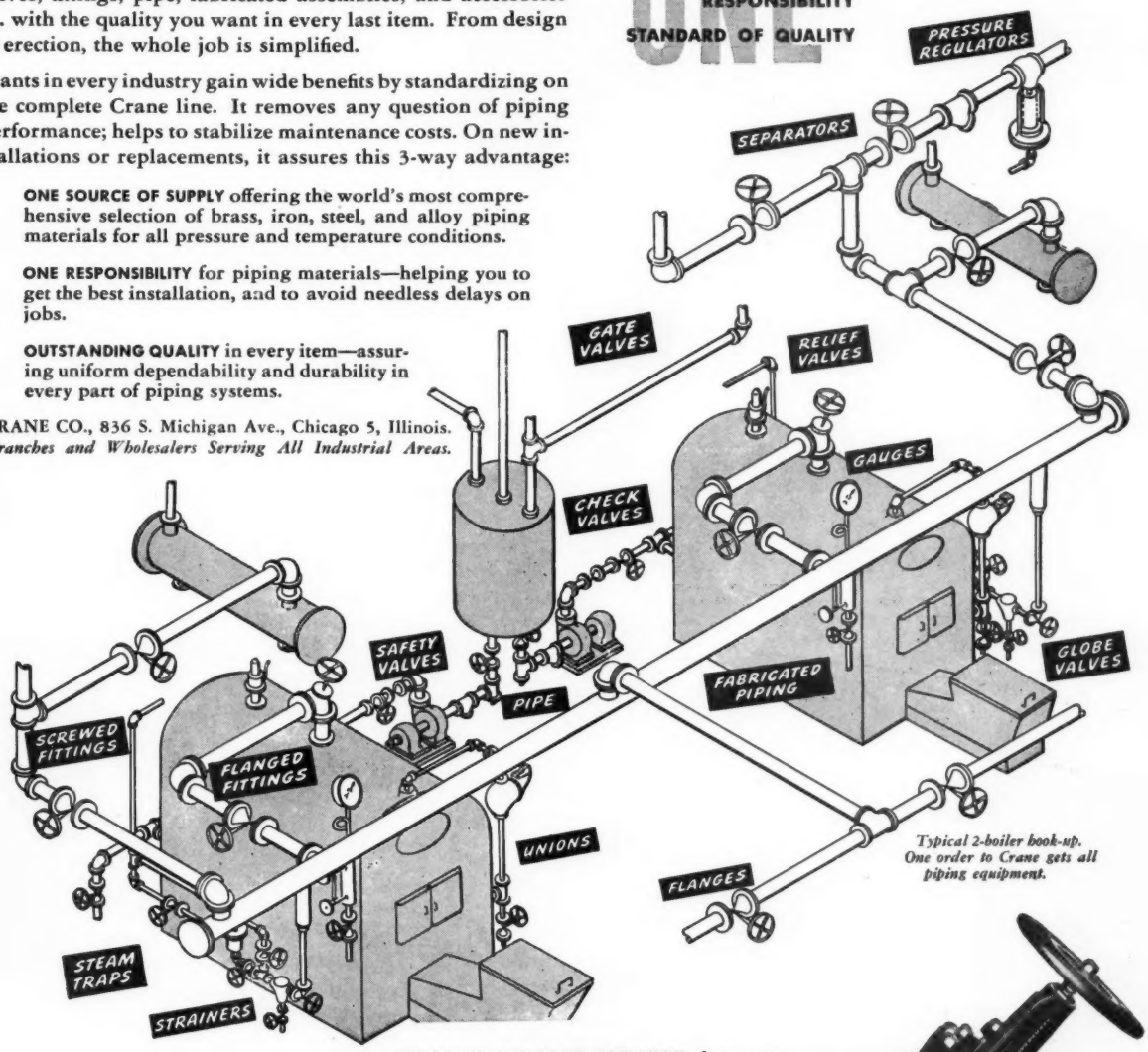
ONE SOURCE OF SUPPLY offering the world's most comprehensive selection of brass, iron, steel, and alloy piping materials for all pressure and temperature conditions.

ONE RESPONSIBILITY for piping materials—helping you to get the best installation, and to avoid needless delays on jobs.

OUTSTANDING QUALITY in every item—assuring uniform dependability and durability in every part of piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Illinois.
Branches and Wholesalers Serving All Industrial Areas.

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



Typical 2-boiler hook-up. One order to Crane gets all piping equipment.

(Right) **FOR SAFE BOILER OPERATION,** *choose automatic stop-check valves with a proved performance record. In iron or steel, Crane offers the exact type and size you need. For steam pressures up to 250 Pounds, 450 Deg. F. maximum, Crane recommends this Ferrosteel pattern, angle or straight-way, usable in two positions. Sizes up to 10 in. See your Crane Catalog.*

EVERYTHING FROM . . .

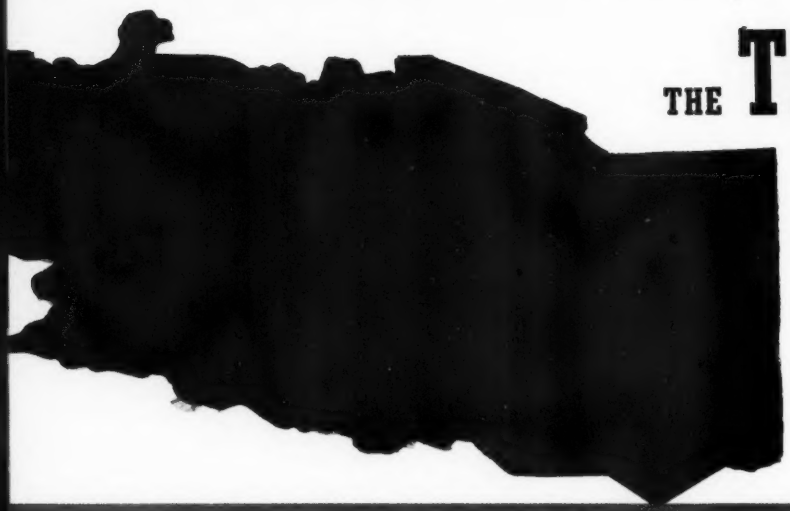
VALVES • FITTINGS
PIPE • PLUMBING
AND HEATING

CRANE

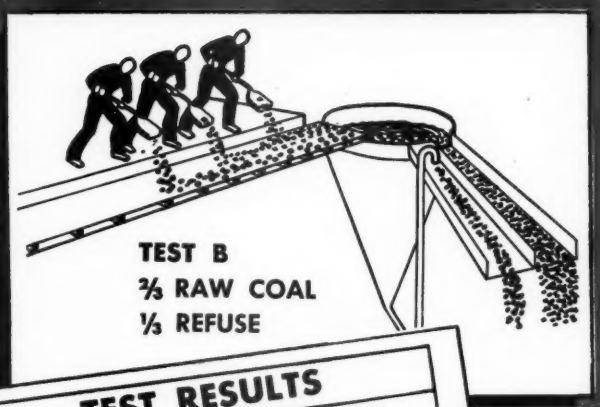
FOR EVERY PIPING SYSTEM

THE TREND UNDERGROUND

FULL-SEAM EXTRACTION
HIGH-SPEED LOADING
COMPLETE MECHANIZATION
SAFE LOW-COST MINING



TEST A
ALL RAW COAL



TEST B
⅔ RAW COAL
⅓ REFUSE

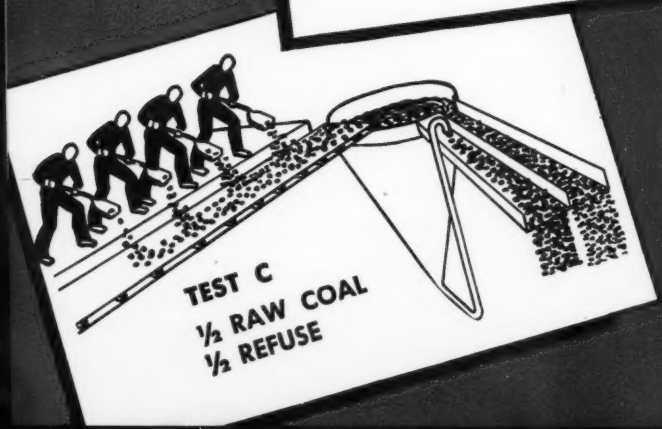
FLOAT-SINK ON FEEDS

	RAW COAL	ADDED REFUSE
Float 1.41	85.17	..
Float 1.46	1.77	2.80
Float 1.51	1.05	10.84
Sink 1.51	12.01	86.36
± .05 at 1.46	2.82	13.64

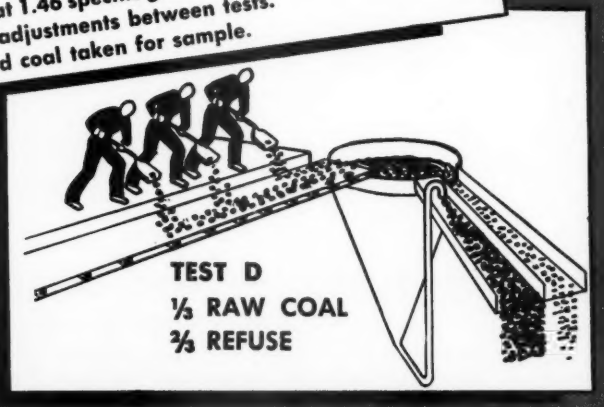
TEST RESULTS

TEST	FEED ±0.05	COAL % WT.	COAL % 1.46 SINK	REFUSE % WT.	REFUSE % 1.46 FLOAT
A	2.82	87.15	0.33	12.85	0.59
B	6.52	55.10	1.25	44.90	0.23
C	8.33	38.30	0.20	61.70	0.70
D	10.05	24.27	0.81	75.73	0.61

Separation at 1.46 specific gravity.
No changes or adjustments between tests.
All refuse and coal taken for sample.



TEST C
½ RAW COAL
½ REFUSE



TEST D
⅓ RAW COAL
⅔ REFUSE

POSES THIS **PROBLEM** FOR PREPARATION ENGINEERS

HIGH AND FLUCTUATING REFUSE-CONTENT IN RUN-OF-MINE COAL

TO WHICH THERE IS ONE LOGICAL

ANSWER

EFFICIENT CLEANING WITHOUT LOSS OF CAPACITY DESPITE EXTREME FLUCTUATIONS IN THE REFUSE CONTENT

ONLY HEAVY-MEDIA SEPARATION CAN COPE WITH LARGE AND VARIABLE QUANTITIES OF REFUSE IN RUN-OF-MINE COAL WITHOUT LOSS OF CAPACITY OR CLEANING EFFICIENCY

Reason? Only Heavy-Media Separation provides continuous withdrawal of refuse *without volumetric limitation!* Tonnage never need be cut back or off-quality coal shipped because too much refuse starts coming up from the mine.

Proof? Scan the test results on the page opposite—large-scale pilot plant tests made on coals purposely adulterated to be far below commercially-mineable grade.

Then remember: In existing plants, Heavy-Media Separation has treated millions of tons of ore from which the *sink removed runs three times the tonnage of the float.*

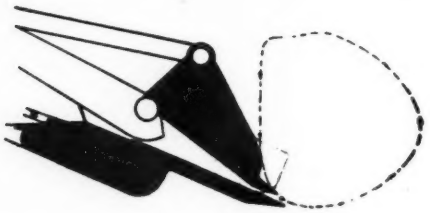
Heavy-Media Separation closely duplicates washability curves . . . making a razor sharp separation within a gravity range of 1.25 to 3.40 . . . maintaining any pre-determined density continuously within ± 0.01. No other process approaches this efficiency. Yet, if specifications change, the separating gravity can be quickly and easily adjusted.

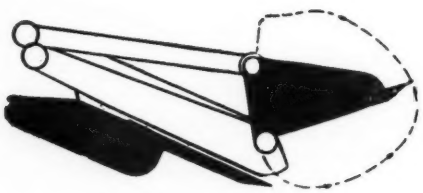
For all these advantages, Heavy-Media Separation carries no compensating penalties. By continuous reclamation, loss of the low-cost separating medium is negligible. Equipment is standard, time proved. Operators need no unusual skills. Labor costs per ton are infinitesimal. Capital costs permit use on any seam worth mechanizing!

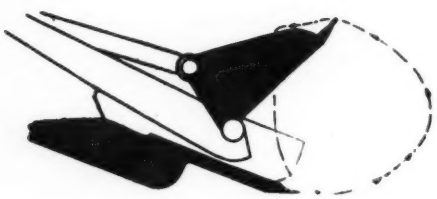
Cyanamid stands ready to run carload lot tests on your coal; to help your engineers design a Heavy-Media Separation unit into your preparation plant; to provide practical assistance in tuning up the installation.

SAFE LOADING

—Another reason why you need the WHALEY "AUTOMAT"







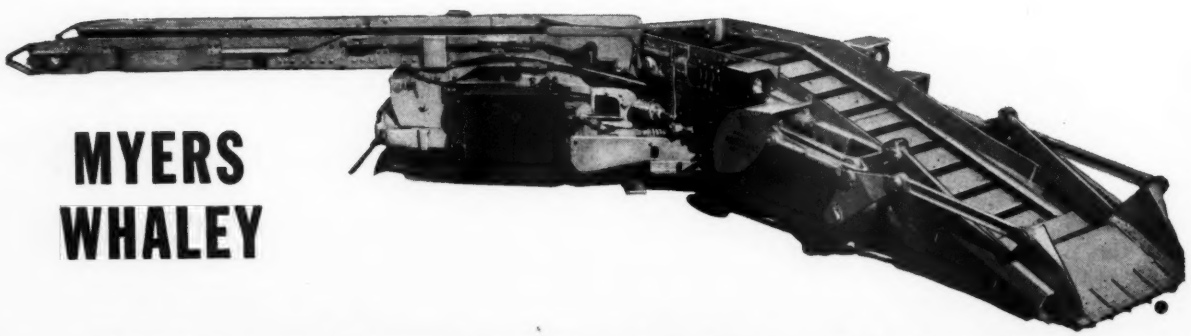
Safe loading is a factor wise mine operators just can't afford to overlook in buying a loader. When you are working in narrow entries and closely timbered places, sudden side kicking of a rear conveyor can mean disaster . . . serious injury to men . . . knocked out timbers and falls.

Safe loading is as dependable as maximum production, even under the most adverse working conditions, with the Whaley "Automat." You see, the loading head of the Whaley "Automat" operates in a vertical lift shoveling action . . . all power is directed in a vertical plane, making side kicking impossible. Therefore, the danger of crushing men or knocking out timbers is eliminated.

If you're buying a loader, buy a safe loader, along with maximum production at minimum power costs, too. You'll get all of these advantages in a Whaley "Automat." And remember, the "Automat" will load — in its stride — any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larries, can take. Myers-Whaley Co., 139 Proctor, Knoxville 6, Tennessee.

Note in illustrations above how the natural shoveling action of the "Automat" is an under, up and back movement for depositing coal on front conveyor.

Wm. Neill & Son, Ltd., St. Helen's Junction, Lancashire, England, are licensed for Manufacture and Sale in Great Britain and Europe.



MYERS WHALEY

Mechanical Loaders Exclusively For 39 Years

Mining CONGRESS JOURNAL

Contents

VOLUME 33, NUMBER 6 FOR JUNE 1947

FRONT COVER: Changing Bottom of Bessemer Converter, Benwood Works, Wheeling Steel Corporation.

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

Published Monthly. Yearly subscriptions, United States, Canada, Central and South America, $3.00. Foreign, $5.00. Single copies, $0.30. February Annual Review Issue, $1.00. Entered as Second-class Matter, January 30, 1915, at the Post Office at Washington, D. C.

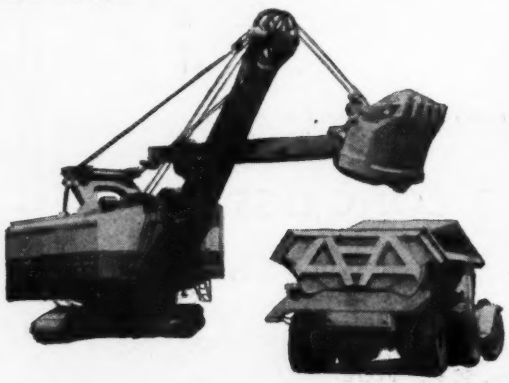
ABC

Saves precious

between here...

Type 1050B stripping shovel, 33 cubic yard capacity, amplidyne-equipped

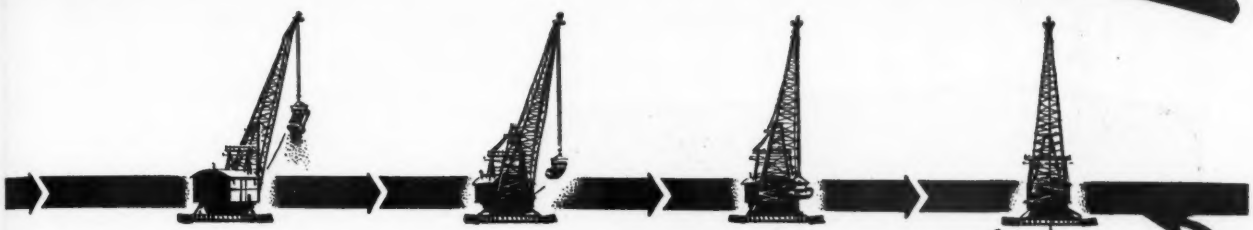
Type 5561E stripping shovel, 35 cubic yard capacity, amplidyne-equipped



Type 151M loading shovel; 6 cubic yard capacity, amplidyne-equipped

Type 1150B walking dragline for anthracite stripping; 25 cubic yard capacity, amplidyne-equipped

Seconds...



...and here

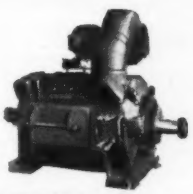
G-E Amplidyne control for electric excavators gives you faster cycles — greater tonnage per machine — lower stripping costs!

It happens whenever an electrified shovel or dragline comes on to a stripping. Yardage records are broken—overall costs go down. A large part of the credit must go to the General Electric Amplidyne—heart of the control system that has helped in no small way to make coal stripping a profitable operation. The reasons?

FIRST—Amplidyne control gives your operator a swifter, surer touch. Motors respond almost instantly to his signals. Fast acceleration and deceleration cuts precious seconds off hoist, swing, and crowd (or drag) motions. Operating cycles are shorter, daily tonnage handled is higher.

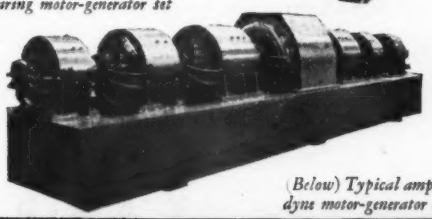
SECOND—Equipment downtime is smaller because stress on pinions and front-end strain is kept to a minimum. The Amplidyne acts as a regulator and even at high speeds, prevents the excessive current and torque peaks which damage electrical and mechanical machinery.

THIRD—Amplidyne is basically simple. Fewer control devices are used in an Amplidyne control system. They need less maintenance—require less space—stay on the job longer. General Electric has equipped more than 2000 shovels and draglines with electric drive. For the past five years, the modern Amplidyne control has been a feature of nearly all large shovels and draglines equipped by General Electric. Without exception, owners of these electrified excavators have benefited from smoother, faster operation and greater shovel capacity per day. When you specify electrical equipment for your next shovel, make sure it is Amplidyne-equipped. Simply get in touch with your nearest General Electric field office for information and assistance. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



(Right) Type MDP mill motors provide great mechanical strength coupled with improved electrical characteristics

(Below) 7-unit a-c to d-c ball-bearing motor-generator set



(Below) Typical amplidyne motor-generator set

GENERAL ELECTRIC

NEW CARDOX Mine-Fire CAR

ENGINEERED TO PROVIDE MAJOR PROTECTION AGAINST

DEEP-SEATED COAL FIRES

OIL FIRES

ELECTRICAL FIRES

The Cardox Mine-Fire Car combines in a single mobile unit facilities for (1) driving out smoke and reducing the temperature in a room or passageway, (2) sealing the surface around deep-seated coal fires with "CARDOX FIRE COAT," (3) quickly extinguishing oil and electrical fires, with absolutely no damage by the extinguishing medium to the equipment involved, (4) "CARDOX FIRE COAT" provides a quick, effective method for creating temporary, rigid fireproof seals in burning areas, (5) provides CO_2 for inerting the atmosphere to prevent an explosive concentration of methane gas.

Full details on the size, design and fire-fighting efficiency of this specialized Cardox Mine-Fire Car are available in a bulletin just off the press. Write for your copy today.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS

District Offices: New York . Philadelphia . Library, Pa. . Pittsburgh . Meadowview, Va. . Harper, W. Va. Camden-on-Gauley, W. Va. . Cleveland . Detroit . Evansville, Ind. . Benton, Ill. . St. Louis Louisville, Col. . San Francisco . Los Angeles . San Diego

Drives out smoke

Seals up deep-seated coal fires

Smothers oil fires fast

The Model T Rear-Dump Euclid has abundant power and speed for steep grades. Distribution of weight and large tires result in excellent traction and flotation.

Dumping 22 tons of iron ore into drive-over hopper on the Mesabi Range in Minnesota. Load is shed quickly because of smooth body interior and high dumping angle.

DESIGNED to work with large loading equipment, the Model T Euclid has extra large capacity and unusual power and speed for steep grades. Low loading height, large top area, fast hoist action, high dumping angle, exceptional maneuverability and traction, and high ratio of horsepower to weight . . . all of these Euclid features contribute to efficient performance.

This model has a struck measure capacity of 14.8 cu. yds. and payload capacity of 44,000 lbs. Powered by Diesel engine of 200 to 275 h.p. rating, top speed with capacity payload is 31.2 m.p.h. Hydraulic steering is standard equipment. The drive axle is full-floating and planetary type double-reduction, built for big loads, large engines, and heavy service.

Wherever extra capacity and power are required to move large yardages on difficult hauls, the Model T will do the job with speed and efficiency.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

His stock in trade is *Service*

He's a traveling engineer, subject to your call at any time. You'll find him a capable man, thoroughly versed in modern mining practice. His specialty is trackwork.

He can be a big help when you're figuring a mine-track layout. His job, when you ask for his service, is to study your workings and help devise a system for your individual needs.

He's had broad experience with Bethlehem prefabricated track—track that's *planned,* down to the last bolt and nut. The layouts he has helped figure out are now paying off — complete, efficient systems with a minimum of parts. Track precut and precurved in the Bethlehem shops. Track so easily fitted together, so clearly marked, that even green hands can readily assemble it.

When you reach the planning stage in a track-layout job, let a Bethlehem trackwork engineer sit in with you. A letter or phone call to us at Bethlehem, Pa., will bring one of our specialists to your office or mining property.

A Bethlehem track system means easier installation; faster, safer haulage; lower maintenance costs; lower cost per ton of coal moved. Bethlehem prefabricated track has proved itself in many mines. Folder 521 gives detailed information about it and its advantages. Write for a copy today.

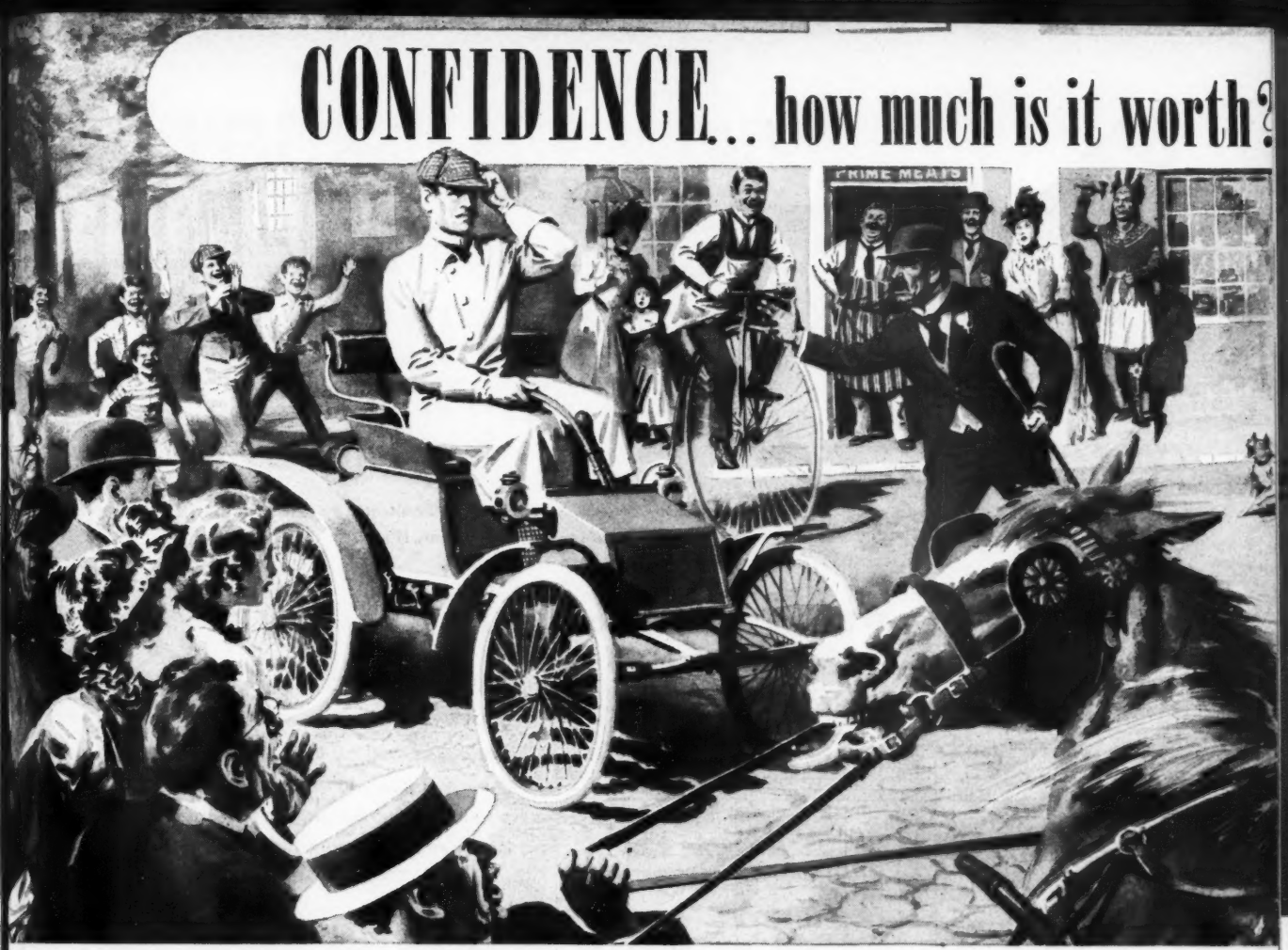
BETHLEHEM STEEL COMPANY,
Bethlehem, Pa.

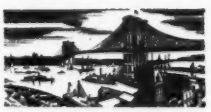
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

BETHLEHEM PREFABRICATED TRACK

CONFIDENCE... how much is it worth?





IT WAS NINE YEARS before the first gasoline-driven automobile in the United States was operated by C. E. Duryea that the Brooklyn Bridge was opened in 1883. This fabulous engineering achievement was the culmination of over 26 years of planning and building, of bold vision and heart-breaking struggle, by John A. Roebling and his son Washington.

But the steadfast confidence of father and son in the success of their amazing venture is vindicated daily by the modern traffic this world-famous bridge continues to carry now . . . 64 years later.

How much is that confidence worth to you today . . . and to the John A. Roebling's Sons Company, now embarked on a multi-million dollar expansion program to meet the future's challenge?

Confidence is the driving power behind our efforts to make better products do better work for you.

You Can't Go Wrong—If You Use the Right "Blue Center" Rope

There's no better way to save wire rope dollars than to use the right rope for your job. That means the right grade of steel, the correct construction, the proper size. And your choice is easy when you specify Roebling "Blue Center" Steel Wire Rope.

In "Blue Center" you get what we feel sure is the finest rope steel made. Secondly, you have a wide range of constructions and sizes to choose from . . . in both preformed and non-preformed types.

Why not make the Roebling Field Engineer your right-hand man in selecting wire rope that will give you peak performance at the lowest overall cost? You can call or write him at our nearest branch office.

The *RIGHT* steel . . .
The *RIGHT* construction . . .
The *RIGHT* size . . .
—FOR YOUR JOB!

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Systems • Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski Lifts • Electrical Wire and Cable • Suspension Bridges and Cables • Aircord, Aircord Terminals and Air Controls • Lawn Mowers

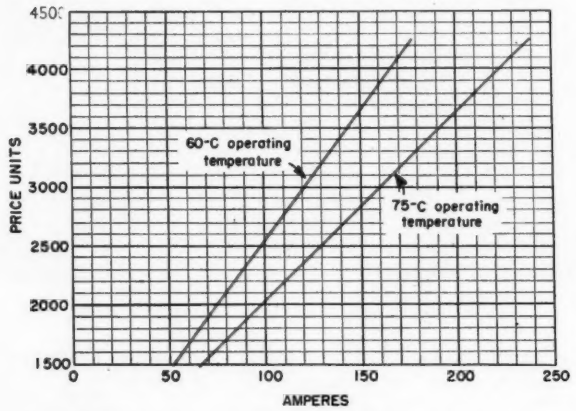
ROEBLING

A CENTURY OF CONFIDENCE

NOW YOU CAN SAVE UP TO 20% AND MORE ON PORTABLE CABLE PURCHASES

You get greater value per dollar with Geoprene Portable cable. It costs less to buy, and what's more, it lasts longer. Here are the facts:

GEOPRENE PORTABLE costs less to buy



High-temperature insulation raises current-carrying capacity, permits use of lower-cost, smaller-size cable.

As shown on the graph, which is based on 5000-volt SH-D cables, average savings in first cost are about 19 per cent, based on the smaller cable size which can now be employed on any given job. Current-carrying capacity has been increased appreciably by use of insulation approved for 75-C operation, instead of the 60-C insulation normally used, with no increase in cost.

On larger cables this saving is particularly important, not only in first cost, but in greater handling ease due to the decreased weight and bulk. For example, a shovel previously requiring a 4/0-awg conductor size can now be served by a 2/0-awg cable.

GEOPRENE PORTABLE costs less to maintain

Most critical factor in portable-cable life is the abuse-resistance of its jacket. And Geoprene* hits a new high in strength and chemical stability. In standard tests *its tear strength is two and one-half times as high as Tellurium,* our famous prewar natural rubber jacket. This remarkable resistance to cutting action and abrasion boosts the life and safety of Geoprene Portable well beyond that of an ordinary portable cable. In addition, Geoprene exhibits 105 per cent better aging properties than required by industry specs., and carries Pennsylvania Dept. of Mines Approval P-108 for flame resistance.

When the facts are combined, Geoprene Portable with its 75-C operating temperature offers a double value compared to cables with rubber jackets and 60-C insulations. And it's less bulky, lighter weight, and easier to handle.

May we suggest that you remember this longer life at a lower price the next time you need portable cable. For details, call your G-E representative or write for bulletin GEA-4229. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

*Geoprene—special G-E compound containing approximately 60 per cent neoprene, with the balance consisting of plasticizers, accelerators, and reinforcing agents.

GENERAL ELECTRIC

502-70

How to cut Haulage Cost

. . . per Year

. . . per Mile

. . . per Ton

!

Use of EDISON Nickel-Iron-Alkaline Batteries in battery-operated locomotives and shuttle cars will help cut your haulage costs in several ways.

Perhaps most important, their unequaled dependability gives the closest approach to failure-free uninterrupted haulage it is possible to obtain. This is due partly to their steel cell construction which withstands rough usage, partly to their alkaline electrolyte which is a preservative of steel, and partly to their electrochemical principle of operation which is free from self-destructive reactions.

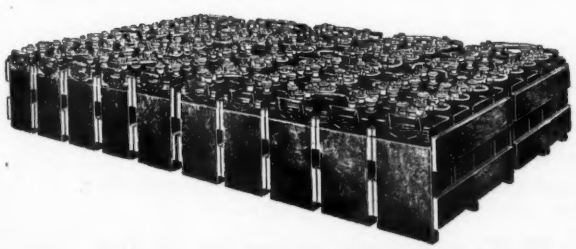
They do not require critical adjustment of charge rates, hence can be charged direct from the d-c power supply through relatively inexpensive resistors without need of motor-generators. They can be fully recharged in 6 to 7 hours and require no equalizing which helps get all charging done during off-peak periods.

Finally, they give much longer service life than other types of batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.* In Canada: *International Equipment Company, Limited, Montreal and Toronto.*

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES



In Mine Locomotive and Shuttle Cars EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages

★ They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.

★ They are **foolproof electrically;** are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.

★ They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.

★ They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.

★ They can **stand idle indefinitely** without injury, without attention, and without expense.

★ They are **simple and easy to maintain.**

A NEW BELT FOR LONG-LIFT CONVEYORS

RAY-MAN CONVEYOR BELT

WITH A NEW RAYON STRENGTH MEMBER
THE TENSION-MASTER BELT

Out of the experience and studies of Manhattan's engineers and scientists comes this *Tension-Master* Conveyor Belt using the super-strength of Rayon. Long recognized as a vastly superior strength member in heavy duty truck and equipment tires, Rayon will now score new triumphs in the field of spectacular long-lift conveyor belt installations.

The Rayon Whipcords in the new RAY-MAN Conveyor Belt, with their high tensile strength and fibre resilience, are designed to meet the high tension requirements of the long-lift belt conveyors.

When you are planning a continuous slope belt operation to replace cars in the mine or open pit, or to replace a series of belts with their costly, troublesome transfer points, be sure to investigate Manhattan's newest development–the RAY-MAN Conveyor Belt, whose Rayon Whipcords are much stronger than conventional strength members and designed for the terrific tension of LONG LIFTS.

Contact your nearest Manhattan representative or write direct for factory engineering counsel on your installation.

Manhattan once more lives up to its tradition – "Keep Ahead With Manhattan" – with a line of conveyor belts that now meets new long-lift conditions in Mining, Quarrying and Construction.

RAYBESTOS R M MANHATTAN

RAYBESTOS-MANHATTAN INC.

Keep Ahead with Manhattan

DRAWING A DOUBLE-BARRELED BEAD . . .

The two advertisements above are examples of one of the five carefully aimed campaigns conducted by the Bituminous Coal Institute—advertising to inform national and community leaders about your industry.

Planned specifically for the business and news magazines whose readers are leaders in public thought and expression, advertisements like the one on the right dramatize the *scientific strides being made by our industry toward the better utilization of coal.* Other advertisements, like the one on the left, strikingly present important facts about mine operation and modern mine communities—working and living conditions, mechanization, and the capital investment required for up-to-date mine operation.

Appearing regularly in *Time, Newsweek, Iron Age, Business Week, Look, Pathfinder* and *U. S. News,* these B. C. I. advertisements reach an audience that is important in character as well as numbers—the top people of American business, industry, professions, politics, and civic affairs.

This campaign is but one of the activities in the broad program of the Bituminous Coal Institute. With three years of solid accomplishment to its credit and with plans for an increasingly active future, Bituminous Coal Institute deserves the full support of every forward-looking Bituminous Coal operator.

BITUMINOUS COAL INSTITUTE

Washington, D. C., Affiliate of NATIONAL COAL ASSOCIATION

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

When used as

PORTABLE SWITCH P

O-B Distribution

help you put controlled power where you want it....when you want it....and at lower cost

Acting as "portable switch panels" for face machines, O-B Distribution Boxes can help put an adequate supply of controlled power where you need it...when you need it...and at lowest cost per ton. As many as three machines can be operated from one trailing cable.

More than mere switch panels, however, O-B Distribution Boxes actually protect as well as control your vital power flow. Since each of the three branch circuits is individually fused, back-up protection is afforded machine cables and controllers.

By interlocking the disconnect switch, to prevent branch circuits from being connected or fuses from being renewed with power "on", both workmen and equipment are safeguarded from hazard.

Only with an adequate flow of controlled power can machines operate at capacity and produce more tons per day... and at lowest cost. Help boost the efficiency of your face operations by handling power through O-B Distribution Boxes. A free descriptive booklet, No. 812-M is available on request.

For a complete power handling system . . . from substation to face

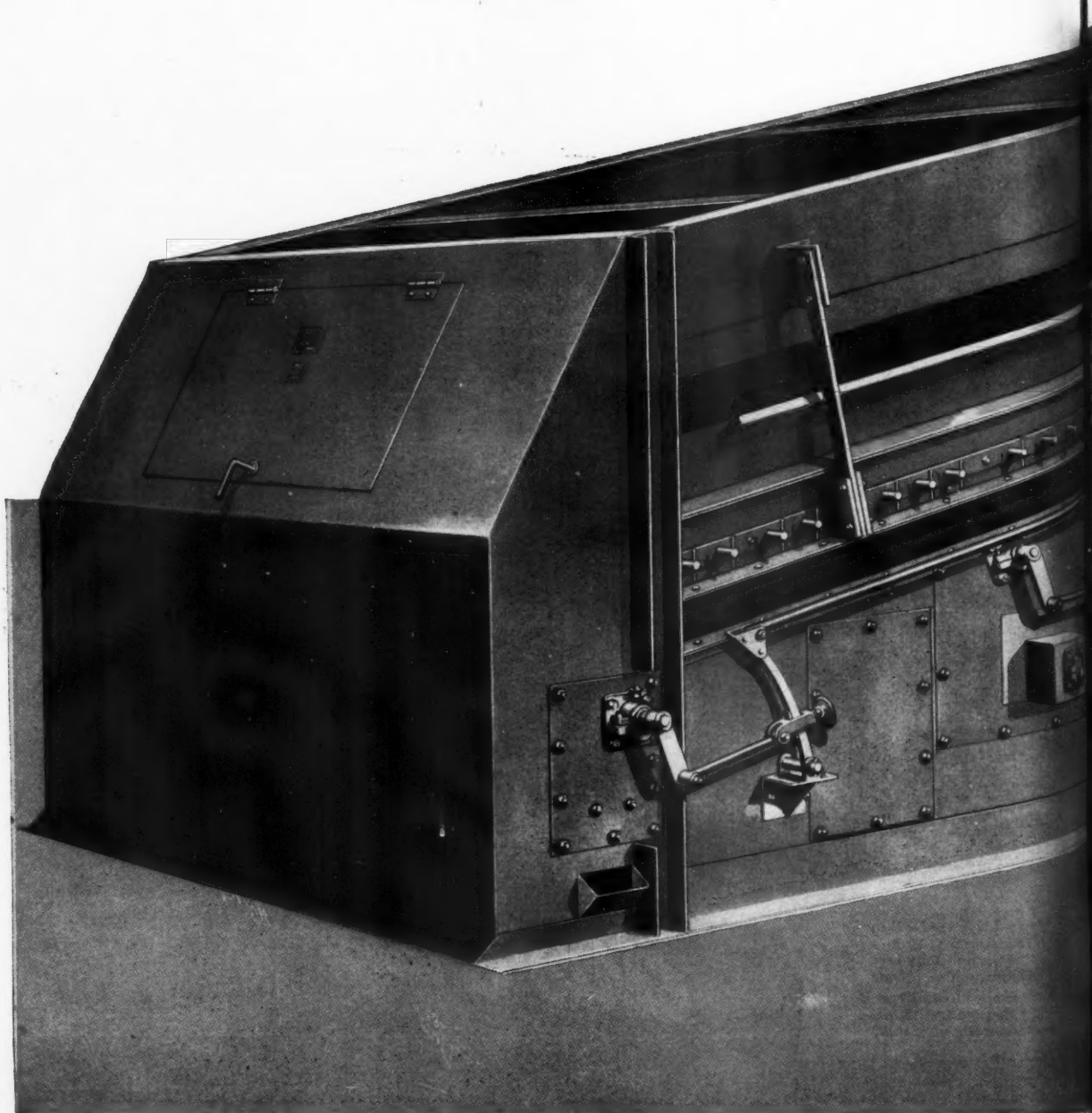
PANELS

Boxes

Type LG Permissible Distribution Box Approved by U. S. Bureau of Mines
(Also available as Type B with non-permissible case for non-gaseous mines)

The NEW ROBERTS and SCHAEFER

for cleaning coal
smaller than 10 Mesh



SUPER-AIRFLOW

Write for descriptive bulletin today
—Make your coal worth more!

ROBERTS and SCHAEFER CO.

307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS

2221 Oliver Building, Pittsburg 22, Pa.
P. O. Box 570, Huntington 10, W. Va.

UNITED STATES RUBBER COMPANY

SERVING THROUGH SCIENCE

MOISTURE RESISTANT

MOISTURE ABSORPTION TEST

Conductor Insulation: 9" of insulated conductor are immersed in distilled water at 70° C for 7 days. Conductor is then removed, weighed and amount of water absorbed calculated from the increase in weight. Moisture absorption must not exceed 25 milligrams per sq. in.

Jacket Compound: Sample of jacket compound of uniform 0.100-inch thickness with surface material removed is first weighed, then immersed in distilled water at 70° C for 7 days. It is then removed and weighed and the amount of water absorbed is calculated—Jacket absorption must not exceed 60 milligrams per sq. in.

You need never worry about moisture affecting U. S. Royal Cords and Cables. Their moisture-resistance has been thoroughly proved by a rigorous immersion test in U. S. Rubber laboratories.

Furthermore, in a series of tests which exaggerate actual conditions, U. S. Royal Cords and Cables are bent, twisted, stretched, pounded, and exposed to flame. The dependability is *proven in advance,* precisely and scientifically.

When it's a question of safety, don't gamble with untested, unproven electrical cables. Specify U. S. Royal, Safety-Tested Cords and Cables.

THE NEW U. S. ROYAL *Safety Tested*

MINING MACHINE AND LOCOMOTIVE CABLES

UNLOAD a Ton of Coal per Second!

Yes, actual timing has shown that with a proper storage bin it is possible to dump a 16-car trip of 5-ton a.c.f. Drop-Bottom Mine Cars in 80 seconds! A "ton-per-second" unloading time!

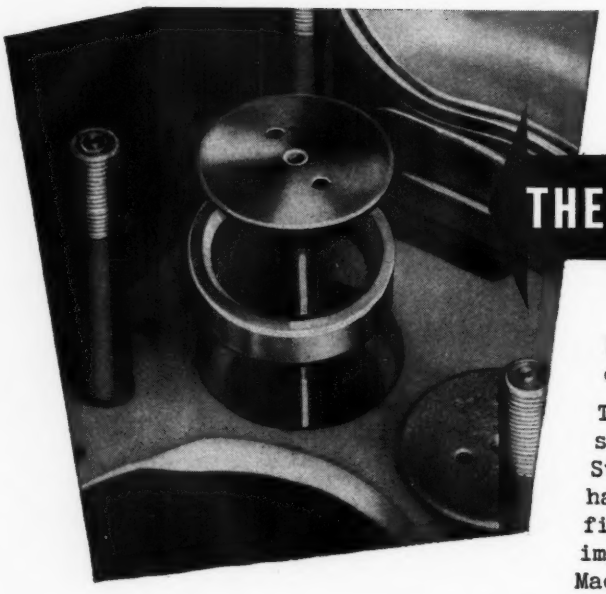
Such speed in dumping permits cars to be returned to the mine immediately—saving precious minutes for greater loading efficiency!

Why not ask our Sales Representatives about using a.c.f. Drop-Bottom Mine Cars in your mine—to increase your daily production—to lower your transportation costs.

AMERICAN CAR AND FOUNDRY COMPANY

NEW YORK
CHICAGO
ST. LOUIS
WASHINGTON
CLEVELAND
PHILADELPHIA
PITTSBURGH
HUNTINGTON, W. VA.
BERWICK, PA.

a.c.f.
MINE CARS



THESE INSERTS STAY PUT

... which is one more reason why Mack trucks click off extra thousands of trouble-free miles.

They're Mack Permafit exhaust valve seat inserts. They're faced with Stellite and copper plated. They have exceptional depth and are shrink-fitted into their pockets. Most important of all -- they're made of Mack's exclusive Niferrite alloy.

This secret alloy has the unique property of retaining a permanently firm fit within the pocket regardless of temperature variations between the insert and cylinder block. Thus, distorted and loose valve seat inserts are prevented.

To Mack owners this means lower maintenance costs and more profitable mileage. Inserts have unequalled resistance to wear. Valve life is prolonged. There's less need for grinding. Engines maintain peak performance longer -- stay more economical longer.

This exclusive Mack alloy is a good example of the extra something that goes into every part of a Mack truck. You get more work out of Macks because we put more work into them.

Mack since 1900, America's hardest-working truck

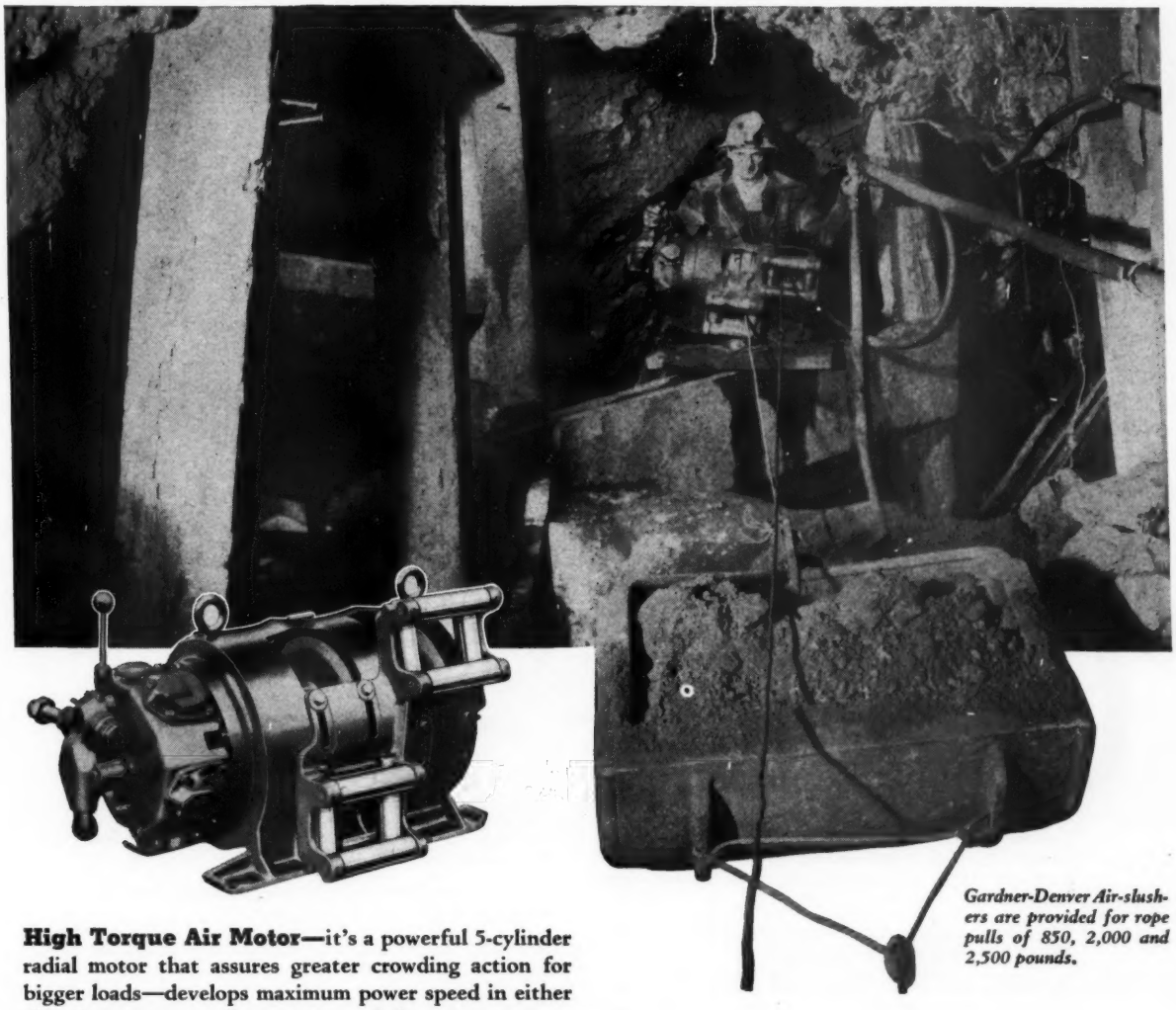
Mack Trucks, Inc., Empire State Building, New York 1, New York.
Factories at Allentown, Pa.; Plainfield, N. J.;
New Brunswick, N. J.; Long Island City, N. Y. Factory
branches and dealers in all principal cities for service
and parts. In Canada, Mack Trucks of Canada, Ltd.

Trucks for every purpose

Mack dump trucks are specially engineered for their own special job. This Model EQX is a good example. It packs a powerful 354 cu. in. engine. Ten-speed Mack Mono-Shift Duplex transmission. Rugged Dual Reduction axles. Plus **structural stamina** in extra measure . . . assured through heavy-duty frame with over-sized side-members, strongly braced by special cross-members of unusual stiffness.

B142-16

Here's why they call it a Quality Slusher



Gardner-Denver Air-slushers are provided for rope pulls of 850, 2,000 and 2,500 pounds.

High Torque Air Motor—it's a powerful 5-cylinder radial motor that assures greater crowding action for bigger loads—develops maximum power speed in either direction—assures a faster return of the empty scraper.

Single Throttle Control—two fingers is all it takes to move the single throttle lever of the Gardner-Denver Air-slusher. The single lever operates the air-slusher in either direction—automatically returns to neutral position when released.

Exceptionally Compact—no extra weight or bulk to make moving difficult through small raises or chutes into stopes. Throttle lever can be lowered to horizontal position for maximum compactness.

Free-wheeling Clutch—applies power at will to either drum by reversing the air throttle. No clutch lever to handle—and no adjustment or lubrication of clutch.

Sealed Construction—lubricant is sealed in—dirt and water are sealed out. The air motor and all wearing parts run in oil and are fully protected against entrance of dirt and water.

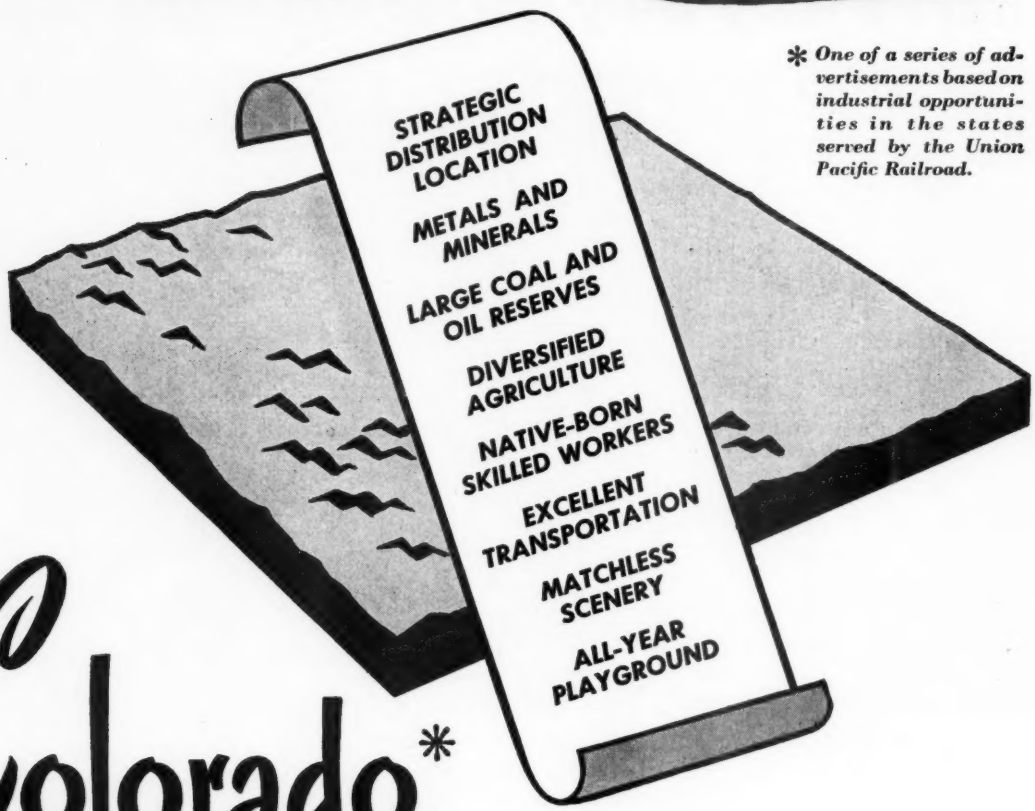
GARDNER-DENVER SINCE 1859

For bulletin giving complete information write, Gardner-Denver Co., Quincy, Ill.

UNION PACIFIC

TREASURE MAP OF INDUSTRY

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*



Colorado*

Colorado offers industry many desirable sites for manufacture, distribution, warehousing, and other purposes. It is strategically located for national distribution.

Diversified agricultural products are of high quality due to favorable climate and soil.

More than 250 useful metallic and non-metallic minerals and compounds have been found, including precious uranium. Timber, oil and coal are practically unlimited.

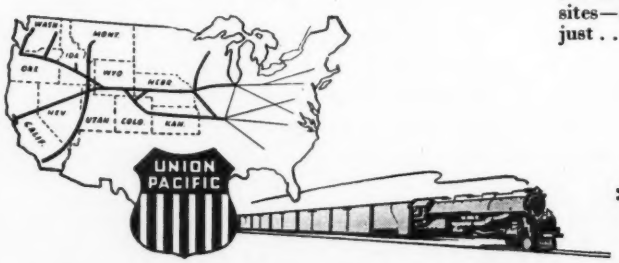
Native-born skilled labor, and a healthful climate resulting in fewer "time-outs" assure economical production.

Colorado provides sound state economy, modern educational and cultural facilities.

Thousands of vacationists enjoy its mountainous splendor, cool summer breezes and winter sports.

Union Pacific provides Colorado with unexcelled freight and passenger transportation. Every night, over night Streamliner service between Denver-Chicago . . . Denver-St. Louis.

For assistance in securing industrial and commercial sites—and for all-weather, dependable rail service, just . . .



be Specific – say "Union Pacific"

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

THE tougher the job the more you need a Baker . . . for only a Baker Bulldozer gives you the rugged power, sturdy construction, and dependable performance that means low cost yardage on any job.

A Baker's rigid, sturdy construction gives you the heft that is necessary for tremendous down pressure, and terrific pushing power — its simplicity means less linkage, fewer points of wear, less down time—and new machine rigidity throughout the life of the unit.

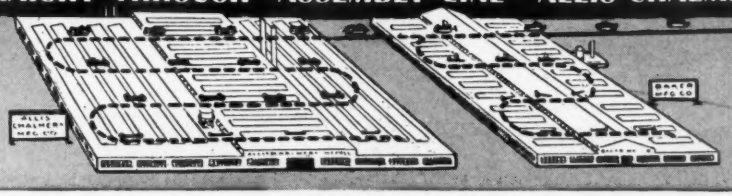
When there's yardage to move and the going is rough — call on a tractor-bulldozer team that has the speed, hitting power and balance you need to lick it — see your nearby A-C Baker distributor today.

BAKER MFG. CO. • Springfield, Ill.

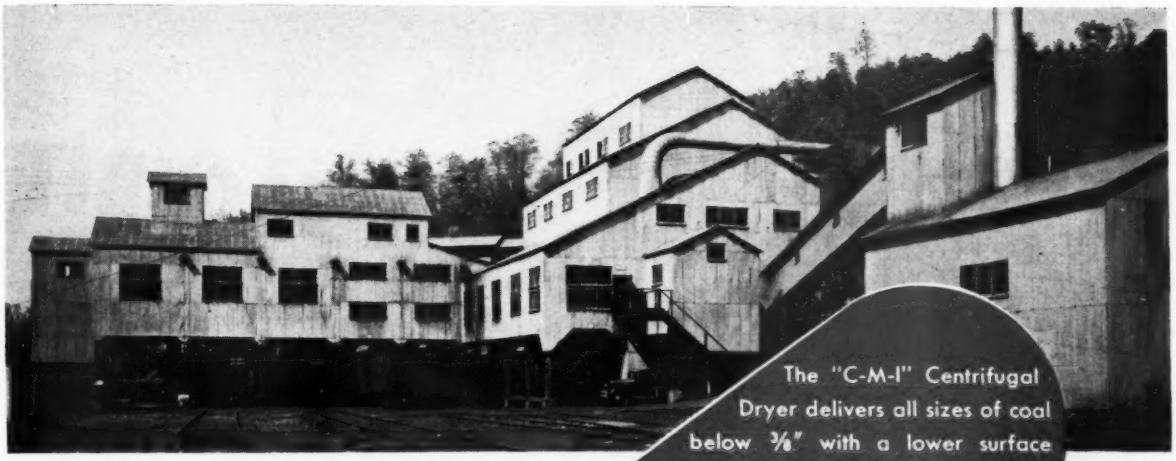
BAKER

BAKER They Go Together! AC

"STRAIGHT THROUGH" ASSEMBLY LINE – ALLIS-CHALMERS TO BAKER TO YOU!



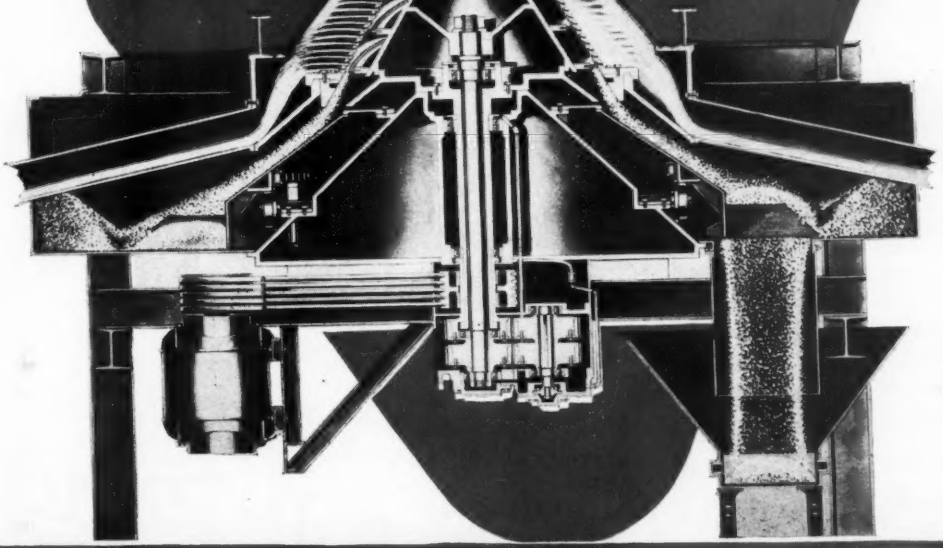
The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.



The "C-M-I" Centrifugal Dryer delivers all sizes of coal below ⅜" with a lower surface moisture content than can be obtained by any other mechanical dewatering machine or method. And with very little degradation.

For those plants where recovery of all the finer sizes is required, then by a closed circuit arrangement practically all the fines may be recovered and used, even down to the minus 200 mesh particles.

At places where large amounts of ash in the form of clays are mixed with the finer sizes then a reduction of the ash can and is being obtained as well as a very dry product.



Use the "C-M-I" *Continuous Centrifugal* to dry your smaller sizes of coal at the lowest ultimate cost.

CENTRIFUGAL AND MECHANICAL INDUSTRIES INC.

3600 SOUTH SECOND ST. · ST. LOUIS 18, MO.

HERE IT IS

THE STUD JACKBIT

ANOTHER LEADER IN THE JACKBIT LINE

Outstanding features of the Stud Jackbit and Jackstud.

The Stud Jackbit is a new addition to our widely used line of Jackbits. It drills faster, has longer life, and is easier to detach. This bit and the revolutionary Jackstud have many new features and advantages.

The outstanding performance of the Stud Jackbit is due in part to its extra strong construction. More metal has been placed in the bit skirt. This added strength prevents breakage and reduces upsetting to a minimum.

The newly designed curved wings of the Stud Jackbit insure new bit performance during its entire life...the length of the gauge face remains constant with successive resharpenings.

The Jackstud design permits the use of the best possible alloy material for the attachment thereby providing strength and durability unobtainable in a one-piece drill rod.

The Jackstud has uniform factory-perfect threads that run right up into the driving shoulder. There is no undercut into which bits can upset and lock on. Also the Jackstud is carburized and case hardened. These features result in longer thread life of both rod and bit.

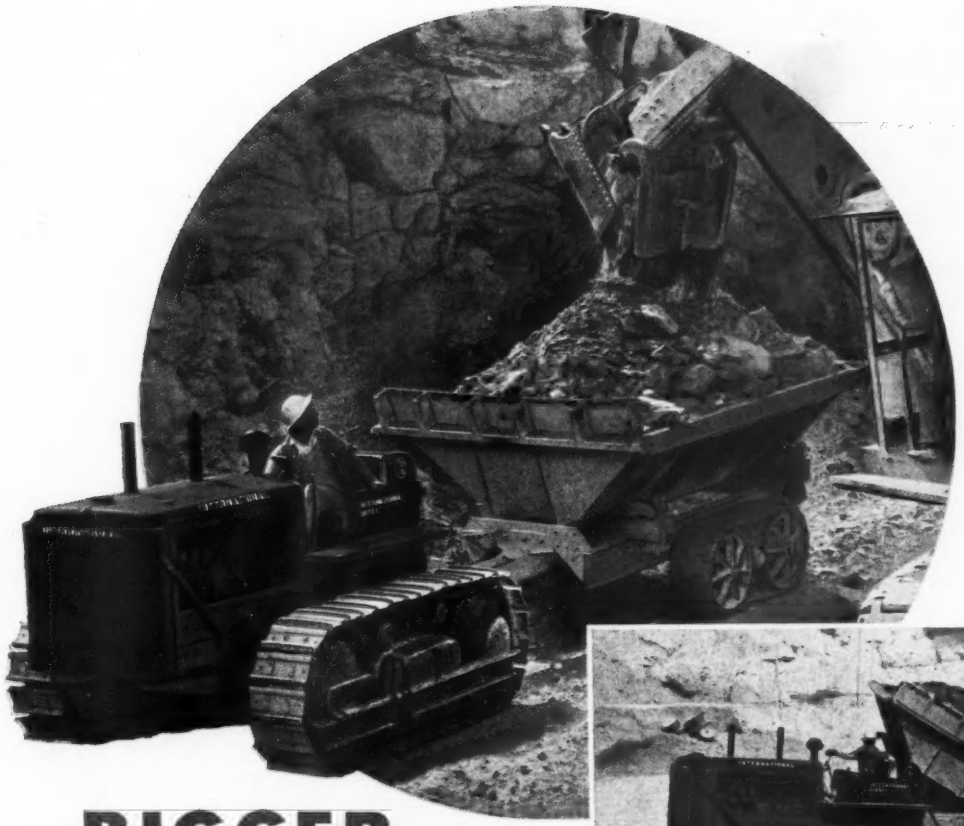
The driving of the cold Jackstud into the heated end of a Jackrod is a simple matter, especially when using an I-R sharpener with which most shops are already equipped.

Ask our sales engineers to discuss with you the applications and advantages of the Stud Jackbit.

Ingersoll-Rand 2-15

11 BROADWAY, NEW YORK 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • OIL AND GAS ENGINES
CENTRIFUGAL PUMPS • TURBO BLOWERS • CONDENSERS



BIGGER PAY LOADS

when you haul with

INTERNATIONAL CRAWLERS

That's the picture at this asbestos mine! Ten to thirteen yards of pay is the average load on the rough route from pit to chute. And it's a one-man job for each tractor-wagon unit.

Brute lugging power, unbeatable economy of fuel and maintenance, quick and easy all-weather starting, matchless serviceability—these are some of the features that make International Diesel Crawlers pay off in profits at the mines.

Ask your nearby International Industrial Distributor to demonstrate.

INTERNATIONAL HARVESTER

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue • Chicago 1, Illinois

Tune in James Melton on "Harvest of Stars" every Sunday, NBC Network

INTERNATIONAL *POWER*

CRAWLER AND WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

Mining CONGRESS JOURNAL

Published for the Entire Mining Industry by The American Mining Congress

JULIAN W. FEISS, Editor

Volume 33 JUNE, 1947 Number 6

STREAM POLLUTION LEGISLATION

SINCE April a Senate Public Works subcommittee has been holding hearings on the Barkley-Taft Water Pollution bill. Three bills are also under consideration in the House, these being proposed by Representatives Mundt, Spence and Elston, respectively.

Under these bills the Surgeon General is authorized to recommend corrective measures and prepare plans for the abatement of pollution in interstate waters. Furthermore, if remedial action is not taken within a specified period after notification by Federal authorities, the Surgeon General can recommend suit through State health authorities or interstate agencies. If such action is not initiated within two years, injunctions shall be requested by the Surgeon General through Federal attorneys. The Mundt bill, H. R. 123, goes even farther by providing that after its enactment, "no new sources of pollution shall be permitted to be discharged into any inter-state waters without the approval of the the State health authority made in compliance with regulations prescribed by the Surgeon General. Such action shall be brought as an action in equity, and may be brought in any court of the United States having jurisdiction to hear and determine equity cases."

Obviously such a provision could sound a death knell to new mining and milling enterprise throughout the country. Also, since there is no practical and economically feasible means of neutralizing acid mine drainage from either bituminous or anthracite operations, such a law would be equally disastrous to the coal mining industry.

The proponents of such national legislation always assume that States and small communities are incapable of self-government. Many of our municipalities, cooperating with research organizations in the coal industry, have been successful in combatting the similar problem of atmospheric pollution through constructive measures of smoke control. In California stream pollution, incident to dredging, is being handled locally and in Idaho, Montana, Colorado, and other Western States, where mining is an industry of prime importance, stream pollution receives constant attention and mine operators have cooperated for many years with local authorities. Where streams run through or along the boundaries of several States the mechanism of interstate compacts, such as have been developed in the Ohio, Potomac, and Delaware river basins, affords a means for adequate handling of pollution problems.

A seductive but highly objectionable feature of these bills involves loan and grants-in-aid to industrial establishments and municipalities for treatment works. Although limited by provisions for cooperation on the part of State health authorities, we find another spigot driven into the Federal Treasury. Altruistic though the purpose may be, once more the taxpayer would foot the bill.

Again we find American industry threatened by Federal policing. Again it is proposed that centralized authority in Washington invade the rights of our smaller communities. Again we encounter a raid on the Treasury. Again—The Cult of the Great White Father.

In 1893, Grover Cleveland said during his inaugural address, "The lessons of paternalism ought to be unlearned and the better lesson taught that while the people should patriotically and cheerfully support their Government, its functions do not include the support of the people."

To this we say "Amen."

THE PROOF OF THE PUDDING

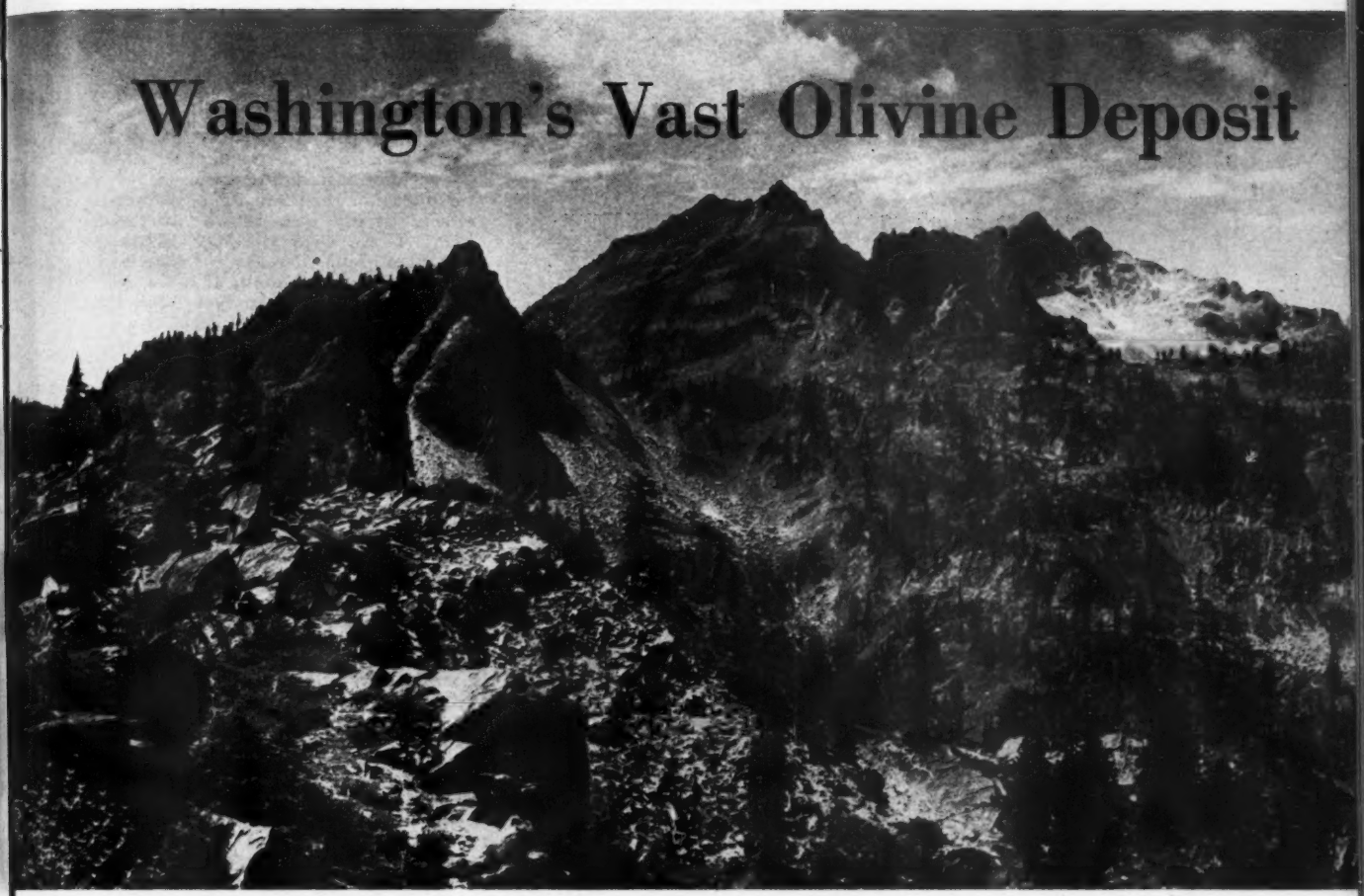
THE 1947 Coal Convention and Exposition are history. Those who attended the Cleveland gathering can judge for themselves whether or not the coal industry is progressive, enterprising, and capable of serving our national requirements. The remarkable machinery displays, the ingenuity shown by the manufacturers of mining equipment, the constructive and critical attitude of coal men at their numerous operating sessions—all of this constitutes a powerful reply to those who think that coal cannot stand on its own feet. Actions speak louder than words.

It is unfortunate that individuals who advocate the nationalization of our mines never attend these meetings. We are certain that Henry A. Wallace would have been both astonished and instructed by a few hours visit to the Cleveland Exposition Hall during the Coal Show. Possibly Mr. Wallace can speak more freely when he is not fully informed.

If the American coal industry is so in need of nationalization, why did representatives from foreign coal producing countries—where governmental control is the rule—attend the Convention? It appears to us that our leadership in coal technology has been recognized throughout the world.

Here we rest our case. When and if it can be demonstrated that a government controlled coal industry in any nation can outstrip individual initiative and private enterprise in this country—then and then alone will we consent to take Mr. Wallace seriously.

Washington's Vast Olivine Deposit



The Twin Sisters Range

Olivine is a Valuable Refractory Material, a Source of Magnesium, and of Fertilizer. This Gigantic Deposit in Washington May be One of Our Great National Assets. Small Experimental Shipments Were Made in 1946 and Larger Ones are Expected This Season

★

By MILNOR ROBERTS
Dean of the College of Mines
University of Washington, Seattle

★

IN the state of Washington and near the western end of the Canadian boundary line on the mainland is a very large deposit of olivine that as yet is little known to the mining public. Attention has been called to it recently through shipments of the olivine being made to the East where it is being tested for its refractory properties. The suitability of olivine in general for use in the form of fire brick for the lining of furnaces operating at high temperatures is well recognized. Studies and tests of the Washington material performed during the last decade at the University of Washington in Seattle have demonstrated its exceptionally high quality.

The deposit occurs in the form of a mountain range known as the Twin Sisters. The location of this range can be described as centering 24 miles east of Puget Sound at the seaport of Bellingham and about 18 miles south of the Canadian line. The greater part of the range is in Whatcom County but the southern end extends into Skagit County. Ten miles northeast of the Twin Sisters rises the glacier-clad peak of Mt. Baker, 10,750 ft. in altitude, the most northerly of the volcanic cones that stand as sentinels over the Pacific Northwest.

The Twin Sisters Mountains consist of a main ridge with a length of 11 miles in a direction several degrees west of north; their width is about four miles and they rise to an altitude of nearly 7,000 ft. Ridges lying west of the range hide all but the peaks from the view of people in the settled areas of the Puget Sound region, with the result that the range is little known to the public and not many visitors enter it. The main divide of the Cascade Mountains lies 60 miles to the east.

The range has the peculiar distinction of consisting almost wholly of a single rock-type, namely, dunite, a

Massive blocks are produced by fracturing in the dunite

basic igneous rock composed of minerals of the olivine family. This occurrence is so vast in size and the material possesses such economic possibilities that for the past ten years it has been a subject of study by the University of Washington through its College of Mines in cooperation with the Northwest Experiment Station of the Bureau of Mines in the Department of the Interior. This study has shown that the olivine possesses valuable properties as a high refractory and that its grade for that use is higher than that of any other deposit of commercial importance yet reported in the United States. Papers written on various phases of the olivine deposit, containing numerous illustrations, descriptions of tests, tables and graphs, and totaling 773 pages, are on file in the University library and the mines' branch library.

Vast Tonnages Available

To make certain that the deposit is of commercial size proved to be an easy task, except for the mountaineering required. College of Mines' parties that visited various parts of the Twin Sisters range found it to consist almost wholly of dunite. In other words this remarkable mountain range apparently is one vast deposit of useful mineral having a size to be guessed in tens of billions of tons. While the figure may not equal the number of dollars we owe through our national debt, the tonnage still is an astronomical figure, hundreds of times greater than that for any other olivine deposit yet known in the country. On Cypress Island in the San Juan group, 35 miles to the west, is another mass of dunite that seems small by comparison but yet is estimated in hundreds of millions of tons.

The accompanying cuts prepared from photographs by John C. Pierce, chairman of the mining committee of the Bellingham Chamber of Commerce, show that the lower slopes of the Twin Sisters Mountains are heavily timbered with the evergreens typical of the Northwest forests, especially Douglas fir, western hemlock and western red cedar at the lower altitudes, succeeded by Alaska cedar and other mountain forms that continue up to the irregular timberline. The higher ridges and peaks are rugged, precipitous masses of bare rock. The color of the rock ranges from the olive-green shades for which olivine was named, to the dun color of weathered surfaces which gave the name dunite to this type of rock.

A lens of chronite on the Danny claim

Deposit in Spectacular Region

The views show also that the range has been deeply incised by stream erosion, followed by glacial carving of cirques and rounding of the valleys to U-sections. The higher portions of the range doubtless were scoured clean by the glaciers, remnants of which still remain there. In some areas appearing in the views, sets of major fracture planes are seen to traverse the dunite with considerable regularity. Very commonly the rock is sheared at various angles by a multitude of minor planes which diminish in importance down to cracks spaced only inches apart. Clearly the range has been subjected to stresses in unusual variety.

The fracturing of the dunite has served, since the disappearance of the glaciers, to aid weathering agencies, especially freezing, in the attack on the surface. Noticeable effects are the breaking down of surface rock and the post-glacial cutting of small gulches, especially along fault planes. The whole range drains into two branches of the Nooksack River. The Middle Fork drains the northeast slope, then flows westward around the north end of the range, while the South Fork heads on the eastern slope and curves west around the south end; both forks then flow northward to join the Nooksack on its course to Bellingham Bay.

The mineral olivine or chrysolite, a silicate of magnesium and iron, is nearly as hard as quartz and has a specific gravity of 3.27 to 3.37, the figure increasing with the iron content. The name peridot is applied to gemstones of transparent quality. A typical composition for the olivine family is $(Mg,Fe)_2SiO_4$ but the series grades from forsterite, which is rich in magnesium and nearly free from iron, to fayalite, which lacks magnesium but is high in iron. The material composing the dunite of the Twin Sisters Mountains is rich in magnesium and low in iron, a combination that adds to the economic value of the rock since the fusion point of a refractory composed of it is higher than if the dunite were rich in iron. A fire brick composed mainly of the dunite has a weight of 10.6 lb.

A Potential Source of Magnesium

Besides the value of the dunite as a high refractory, the deposit is interesting as a potential source of magnesium metal. Analyses of many samples taken at widely scattered points, show that the dunite contains about 49 per cent of magnesia, a higher percentage than is present in magnesite, which is a commercial source of the metal. The extraction of magnesium from olivine has been performed on a laboratory scale and investigations to improve the processes are continuing. Apart from its possibilities as a source of metal the dunite in the role of a non-metallic mineral can be electrically fused with phosphate rock to form a magnesia-rich fertilizer. After a series of pilot-plant tests with these materials, Manganese Products, Inc., of Seattle is now remodeling an electric steel furnace, rated at 2,500 kva, for the production of such a fertilizer.

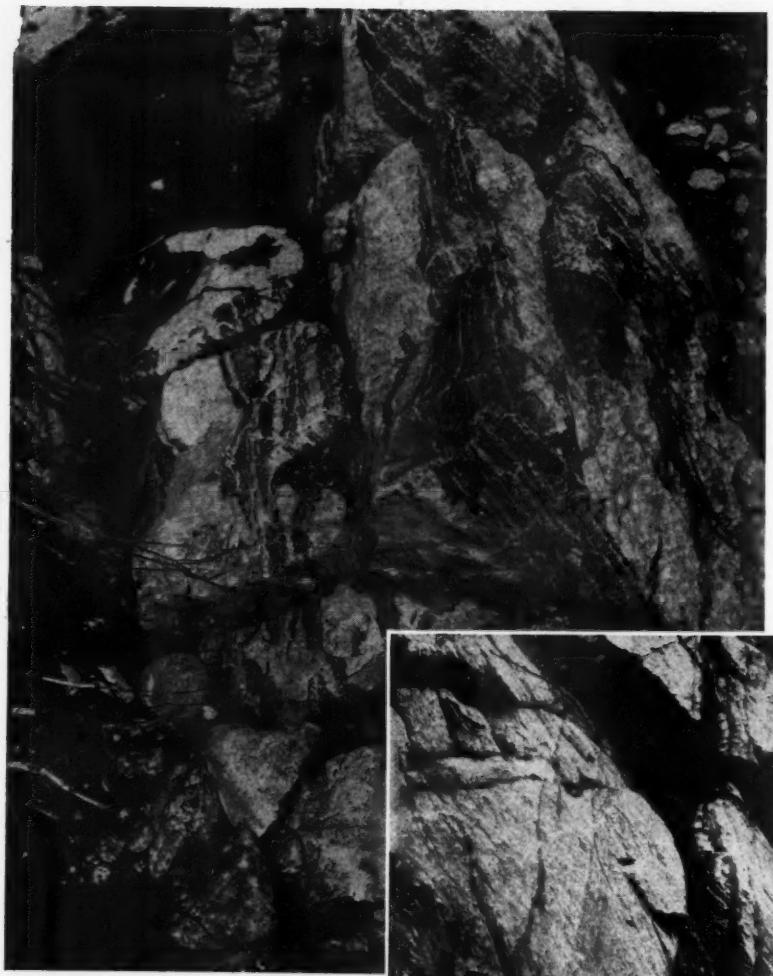
Also of economic interest are the veins and lenses or pods of chromite that occur in the dunite in many places. The composition of the chromite is favorable for its use in making ferrochrome, the ratio of chromium to iron being in the neighborhood of three to one. In another form of occurence, chromite grains of pinhead size are found disseminated through the dunite in numerous areas. Except for these occurrences and some dark-colored dikes, the whole range as fa as known consists of dunite but ma contain other rocks of related char acter.

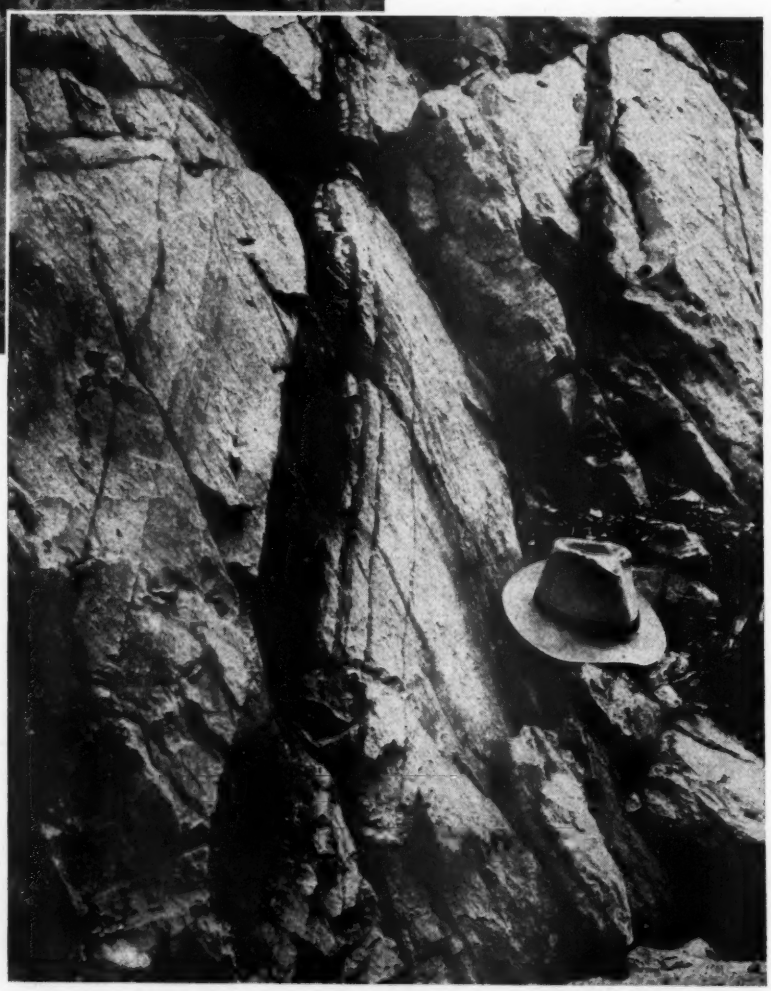
Nearly the whole of the Twin Sisters Mountains lies within the Mount Baker National Forest along its western border. Railroads pass within a few miles of the mountains and logging roads have reached the foothills, but travel into the range is possible only on foot or along a few rough trails by horse. These stony-hearted Sisters have been slow to welcome visitors to their beautiful but rugged retreat.

Shipments Made in 1946

Mining of the dunite could readily be performed at the surface. In this range the olivine miner can truly claim that he has a "mountain of ore." He also has the rare privilege of being able to choose the site of his mine and locate it on the most favorable

A glaciated valley in the Twin Sisters Mountains





Chromite is frequently found in the dunite and sometimes in rich bands as at the right

ground, selecting a moderate slope or a steep one, depending upon the mining method he proposes to use. Areas can be found where the prevalence of jointing would make the cost of breaking down the rock less than the average.

The recent mining took place at the south end of the range in a talus slope conveniently near a logging road. The operation consisted of blasting the larger blocks and loading the material on trucks. In 1946 the shipments amounted to about 1,400 tons; in the coming season a much larger order is to be filled. H. P. Scheel of Sedro-Woolley and Seattle has the mining contract. The dunite is trucked to Hamilton on the Rockport branch of the Great Northern Railway for shipment east over that line for the Harbison-Walker Refractories Company. The shipments in 1946 were sent to Chester, Pa., but this year they will be delivered to the company's new plant in Baltimore. Alva J. Haley, geologist with the Great Northern, has given aid in the undertaking.

The study and tests of the olivine in Mines Laboratory were conducted at first by Prof. Hewiss Wilson of the College and Kenneth G. Skinner of the Bureau of Mines, aided by graduate students; they have been continued to date by Skinner, other staff members, and successive students. John C. Pierce of Bellingham has personally obtained and delivered dunite for the tests. The direction of the tests has been under Dr. H. F. Yancey, supervising engineer of the Northwest Experiment Station, and the writer, who has also taken part in the field studies.

Some Phases of Labor and Economics in the Coal Industry

By C. J. POTTER
Assistant to President
Rochester & Pittsburgh Coal Co.

How can the cost of coal be reduced to the consumer? How can production efficiency be increased? What can research accomplish in coal mining? How can trained college graduates be attracted to the industry? Drawing from a wealth of experience, C. J. Potter presents an analysis designed to stimulate thinking on these questions. Pointing out that the cycle of operations in coal extraction has not changed since the early days of mining in England, Mr. Potter wonders whether there is not an opportunity for original research directed towards simplification of mining at the face. His critical approach is an indication of health in the coal industry. His paper indicates that the industry is neither complacent nor incapable of self criticism. Still not satisfied with present accomplishments, coal is looking to the future.

I THINK that it has been conclusively shown previously that the amount of money a consumer can pay for coal and still continue to burn coal depends on three factors. These are as follows:

1. The selling price of coal.
2. The quality of the fuel purchased.
3. Transportation and handling charges, which can include water or rail transportation and reclaiming from stock piles.

If one considers the item of transportation, the coal industry and the consumers of coal are aware that the rail freight rates are subject to Interstate Commerce Commission approval and, outside of general raising and lowering of rates, primarily because of wage changes, the rail rates are fixed. It is common knowledge, however, that coal traffic pays much more than its proportionate share of the cost of transportation. A simple proof of this statement is that the prosperous railroads in the Eastern United States relatively have heavy coal traffic. Many economists have estimated that the average coal consumer is paying approximately $1 per ton more on the average to the railroads than is actually justified. By justification we mean the cost of hauling coal compared to revenue received, and this compared to the cost of hauling other commodities and the revenue received from those sources. To secure any reduction in railroad rates on coal and increases on other commodities would mean a major battle with the railroads, both before the Interstate Commerce Commission and in the courts. The probability of meeting success in a contest of this type is very remote in any reasonable time.

Water transportation has been steadily climbing in cost as a result of further unionization and its resulting "feather bedding," and has caused a substantial increase in water rates. Also the capital charges for facilities have increased tremendously. For the first time in many cases water and rail transportation together are greater than the all-rail rates.

Storage Increases Coal Costs

The matter of reclaiming coal from storage is one in which the coal industry itself must take steps to remedy. It frequently costs the consumer of coal as much as $1 per ton to put coal in storage and take it out again, and it is deplorable that the consumer of coal has had to do this as many as three times in one year and this has increased his total fuel bill 16 per cent of the annual cost. This resulting increase in fuel cost is a very major item, and only through stable labor relations will it be possible to decrease this very large item of cost to the consumer. It is high time labor and management considered the necessity of a continuous flow of coal to the consumer instead of strike after strike after strike, but I will not comment further on our ability to work this out.

Another factor, mentioned above, in the marketing of coal, was quality. By the use of the most modern preparation plants, which remove the free impurities and dry the coal, quality improvements, as much as 40 cents per ton, have been made on coal, but this large increase in value is rather unusual. It must be pointed out that these increased values, of course, are offset by the increased rejection of the cleaning plants and today's very high capital charges. The major gain in quality is really the maintenance of markets, or providing the producer with the ability to adapt his coal to more favorable markets. It is therefore seen that little savings to the consumer, in terms of dollars, can be made through changes in quality of the fuel shipped to the consumer.

This leaves then, as the item of major consideration, the selling price of the coal at the mine. This selling price must include a profit, for without a reasonable profit, the coal industry will be a declining industry with its resulting increased cost of production. The coal industry is approaching the point where a responsible producer can no longer start a mine on a shoe string, nor can the consumer afford to purchase from an operation of this type. If one examines present day capital charges for complete mechanical mining and preparation, which includes cleaning and drying, one finds high charges. Recent figures compiled for Pennsylvania indicate that the capital charge per ton of annual capacity varies from $4 to $5.50 per ton while in some of the cleaner and thicker seams of West Virginia the charge will be from $3 to $4 per ton.

Depreciation then becomes a major factor on the cost of mining coal, and depreciation rates on these plants will vary from 25 cents to 40 cents per ton, depending upon reserves. No

consideration is given to depletion charges which are increasing.

An item in the cost of producing coal which has substantially increased in the past several years is that of supply cost. Generally all wages have been increased in terms of take-home pay and this, coupled with the fact that the producer is now supplying many items formerly furnished by the mine workers, has brought about a severe increase in supply cost. Records indicate that this increase is in the order of 100 per cent and it is believed that the easier way to reduce this cost will be to change methods of mining at the face, which will be discussed later.

Possibilities of Cost Reduction

Let us consider if there is a possibility of reducing the cost of coal marketing and the cost of management. The most successful way to do this is by merger and consolidation which permits a large sales and production volume to offset these two overhead items. However, the Justice Department and the majority of the people of the United States disapprove violently of this practice and the Government has, time and time again, served notice that it will not permit any extensive consolidation in the coal industry.

Let us consider such items in the aggregate as real estate taxes, insurance, social security, Workmen's Compensation, Mine Workers' Welfare Fund and income taxes. I am quite sure that no one here will agree that there will be any over-all decrease in these items in the next several years. As a matter of fact, we stand to have these items substantially increased.

Having analyzed the above items making up the cost of coal, it is now proper to examine the costs that remain, namely those of the actual productive nature. Let us consider, for example, a mine that produces approximately 7.3 tons per man per day of clean coal. This, by the way, is by far better than the average coal mine in the United States Let us also assume that this mine is a typically thin coal mine and then analyze its production cost. It is appropriate to break down the cost of operation into two phases.

1. The loading of the coal underground and putting it in or on transportation facilities near the face.

2. The necessary services to put the coal into railroad cars.

Under the services part of coal mining, let us consider that the following phases of the operation make up those services:

1. Main line haulage.
2. Ventilation.
3. Transportation.
4. Power and communication.
5. Drainage.
6. Tipple and cleaning plant.
7. Handling supplies, outside.
8. General maintenance.

and such other items which are necessary to permit the production of coal at the face and to get it ready for its movement to market.

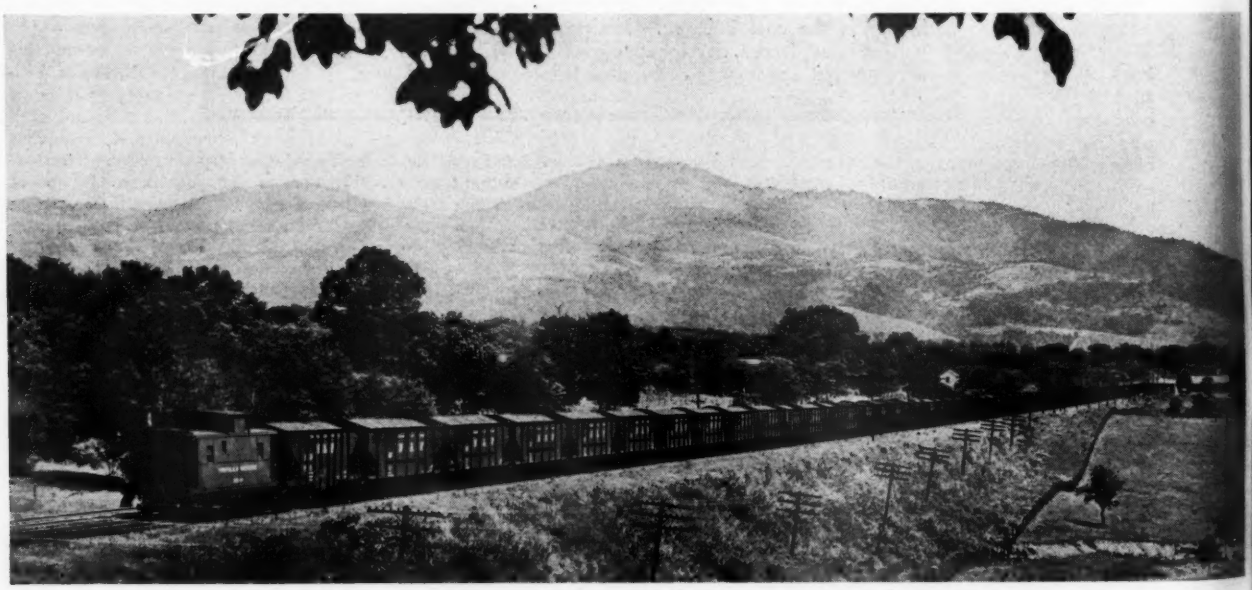
In general, in the thin seam mine producing about 7.3 tons per day, the above numerated items have a labor cost of approximately 43 cents per ton. Supplies for this service amount to about 14 cents per ton. Maintenance costs about 5 cents, and the depreciation charges for all of the services listed above is about 15 cents. The total service cost is then about 77 cents. Assuming that it would be possible to decrease the amount of service labor, supplies, maintenance and depreciation by 25 per cent, it would only mean a reduction of about 19 cents per ton. Coal mining management, on the whole, believes that its most efficient work is done in these categories, and it is, therefore, obvious that services is one of the poorer places to attempt a substantial reduction in cost.

Considering this same mine, the following items for putting coal on cars underground are set forth. These items include labor, supplies, maintenance and depreciation based on present cost of material, and are as follows:

	Per ton
1. Cutting	32c
2. Drilling	14c
3. Shooting	20c
4. Loading	46c
5. Timbering	8c
6. Face ventilation	3c
7. Transportation (other than main line)	41c
8. Supervision	12c
9. Miscellaneous	7c
Total	$1.83

Mining Research Required

Centuries ago in England, coal mining involved the hacking away under the coal by hand to produce a kerf, then knocking the coal down with a pick, which is the equivalent



Coal traffic pays much more than its proportionate share of the cost of transportation

of cutting and shooting, and then loading by hand into small tubs on skids and hauling this coal to a shaft bottom by woman power. In terms of progress in coal mining, we have done nothing to change this cycle of operation. The most that our so-called "tremendous advances" have accomplished is to make these jobs physically easier. It is time to stop and think—Do we really have a progressive industry as yet? This question must be answered in the next few years.

With cutting, drilling, shooting, loading and face transportation alone costing $1.83 per ton at the mine cited above, it is obvious that here is the place to start cutting the cost of mining coal.

It stands to reason that some time, some place, someone will find ways and means to consolidate the items of face production. Too many years have passed without this being accomplished. The impossible in technical advances has been done in every other field except coal. It is now time that it be done here.

The "wait and see" segment of the industry certainly can see today that the United States governmental policy is to maintain wages at very high levels in order that the public may have large buying power—permitting the tax burden to be talked of in terms of high national income. With this sort of policy being applied currently, it is obvious that the mining costs cited above will not decline but, on the other hand, increase.

A high level of wages is advocated by part of the coal industry, particularly that segment with large investments in land and equipment. This is a proper view, for if cost reductions cannot be made in terms of using the workers' earnings to cut costs and to meet competition, then the alternative is management's ability to earn sufficient profits to pay for the necessary capital improvements so vital to cut costs of production.

Increased Productivity Required

Naturally this statement would mean that the greater portion of the coal industry must find ways and means of reducing costs, not in terms of labor's earnings, but in terms of increasing labor's productivity. Increasing productivity in this manner must be divided into two parts: first the machinery to do the job and second, men with sufficient knowledge to originate, improve and operate, and direct the operation of the machinery.

Bituminous coal research is attempting to have the coal industry, the railroads and the various land companies put up a limited fund for the purpose of going into the problem of designing a machine to produce the maximum amount of coal at the face by eliminating many parts of the operating cycle. If the designs look promising and the contributors are satisfied, additional funds will be sought from the industry to put the machines in operation. This is a similar program to that used by the Locomotive Development Committee in progressing the coal-fired gas turbine for locomotives. The entire coal industry, as well as other interested parties, should give this problem very careful attention and back this type of research work most generously. One of the prime reasons that the ers have not given the i. type of equipment it desires . is the very high cost of dev. It is possible to spend several dollars in this manner and I a aware of any single manufacture will, from a financial standpoint, .o this alone. Cases are numerous where manufacturers have spent hundreds and thousands of dollars trying to originate something really new and failure has been the result. The manufacturer today is spending money to improve present equipment even though the savings to the producer are only in the order of five to ten cents per ton. That is good, but not enough.

I call on the manufacturers to join with the industry in pooling ideas and making the best brains available to accomplish successfully this new job. The American Mining Congress members have and are contributing generously in that the value of different pieces of equipment are checked, the best way to accomplish certain jobs with available equipment are studied, and suggestions for improvements in the industry are originated. There is no reason to discontinue any of this work and, if at all possible, these efforts should be expanded to the end that a major change can be made in the coal industry.

Trained Personnel Needed

Along with the machinery problem is the necessity to have men with vision who can improve and successfully operate this machinery. Let us examine our present manpower situation. A very recent study of several

(*Continued on page* 39)

Water transportation has been steadily climbing in cost

Mesabi Range Changes Heavy-Media Practice

Heavy media methods were first used on the Mesabi Range in 1938. Recent improvements indicate that this process may have a wide application in the beneficiation of intermediate grade ores. Some of the possibilities, as well as the limitations, are herein discussed by one of our ablest hydro-metallurgists who has been specializing in this field.

By E. C. BITZER

General Manager
Colorado Iron Works Co.

INTERMEDIATE iron ores always require concentration and may be classified as wash ore, jig ore, possible jig ore and lean ore.

Concentration of wash ore has depended upon the elimination of fine silica by scrubbing, screening, and simple classification of the fines. Aside from the loss of fine iron with the silica in the classified overflow the treatment has been effective and fairly efficient. However, the reserves of crude ore amenable to this treatment are rapidly diminishing and the production of many pits is grading into crude materials that cannot be beneficiated by simple washing. Jigs were first used to treat this type of crude and the term jig ore is still applied to the material by most operators whether or not jigs are used for the concentration step.

The heavy-media process, which depends upon a sink-float separation and eliminates coarse silica-bearing materials efficiently, was first used on the Mesabi Range in 1938. The treatment was successful from the start and the history of the process has been one of steady improvement of equipment and flowsheet. At present there are four operating heavy-media plants on the Mesabi Range of various designs. One purpose of this article is to describe recent developments that make the process considerably more attractive than it was a few years ago. The developments are timely in view of the character of the intermediate ores that will have to be concentrated in the immediate future. The limitations of the treatment will also be discussed as well as some possibilities for extending the usefulness of the process.

Previous Heavy-Media Flowsheets

During the Fifth Annual Mining Symposium at Minneapolis in February, 1944, the flowsheet of the process as it then existed was discussed in considerable detail by Grover J. Holt and L. J. Erck. In order to outline the developments since that time it will be necessary to reproduce that flowsheet and point out certain operating disadvantages that led to experimentation and improvement. A typical flowsheet is shown in Fig. 1. The arrangement of the equipment can and does vary from that shown, but this flowsheet is sufficient for the purpose.

Presented at the 1947 Mining Symposium, University of Minnesota, Minneapolis.

Special Cone Design Required

Separatory cones used on the Mesabi Range are of the inverted or closed-top design as shown. It was learned at the start of experimentation with the process that the ordinary open cone could not overflow material whose specific gravity was between that of the liquid medium and that of the concentrate. Medium is introduced near the bottom of the closed-top cone. The sloping top of the cone produces an increasing velocity of the overflow medium which

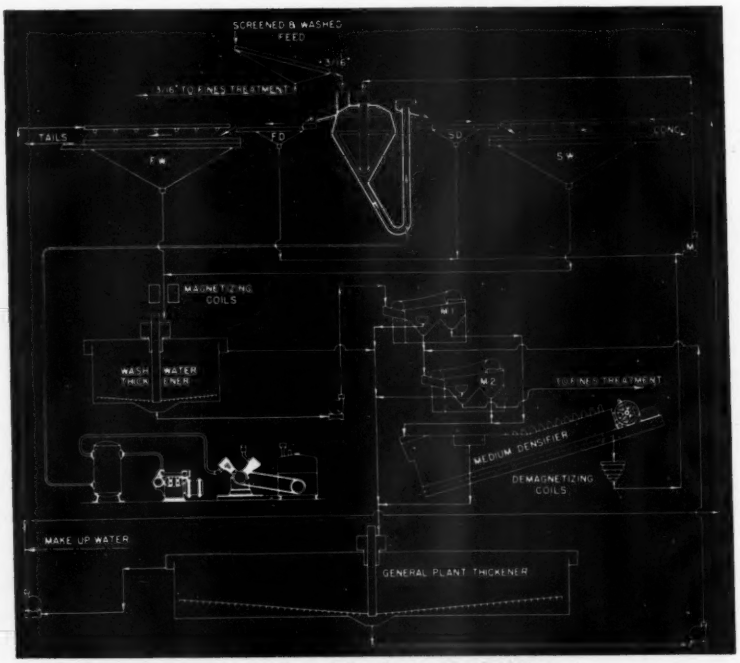


Fig. 1. Typical flowsheet prior to 1944

FW—Float washing screen
FD—Float drainage screen
SD—Sink drainage screen
SW—Sink washing screen
M—Pump
M1—Primary Crockett magnetic separator
M2—Secondary Crockett magnetic separator

helps to eliminate near-gravity particles or "middlings" that otherwise would stay in teeter and accumulate to the point of choking the cone.

This design of cone gave workable and even highly satisfactory results on some types of feed. In the earlier days of the process other items of equipment caused relatively more operating trouble and it was not until these difficulties were solved that some of the shortcomings of the cone assumed the status of problems.

Two disadvantages are inherent in the use of compressed air to discharge the sink product. The air lift is one of the least efficient means of elevating material. In addition to this mechanical inefficiency, a great deal of unnecessary energy is expended in elevating liquid medium that must be drained from the sink product and returned to the cone by the pump (M).

Ferrosilicon medium settles rapidly unless continually agitated, hence the cone is vulnerable to power interruptions unless compressed air is available from a standby compressor driven by power independent of the regular source. The need for air also means that the cone cannot be operated on an intermittent basis unless compressed air and an attendant are supplied. Therefore, the vessel must be drained during a protracted shutdown or for plant repairs. Considerable time is required to refill the vessel and this is an important item in these days of the 40-hour week.

A final disadvantage to cone operation is that the vessel is sensitive to feed surges. Lack of surge-bin capacity is characteristic of plant design on the Mesabi Range and surges in feed rate are frequent. This condition requires constant attendance of the cone operator and if, as often happens, he is preoccupied with other operating details, the natural tendency is to regulate the feed comfortably below the capacity of the plant equipment.

Experiments with the Spiral Classifier

Consideration of the above disadvantages led to an experiment in 1944 with a small Akins Classifier to determine if the machine would perform as a sink-float separator. It was obvious that if the spiral could replace the airlift for removing sink product a number of mechanical advantages would accrue. The results of the tests were very encouraging because it was found that the sink product contained considerably less misplaced float material and middling than that from the cone when treating the same types of ore. The overflow contained more recoverable iron than the cone tailings but the low silica concentrate from the new separator was very attractive. Likewise this classifier turned in a better performance on an ore whose structure was characterized by a large proportion of flats.

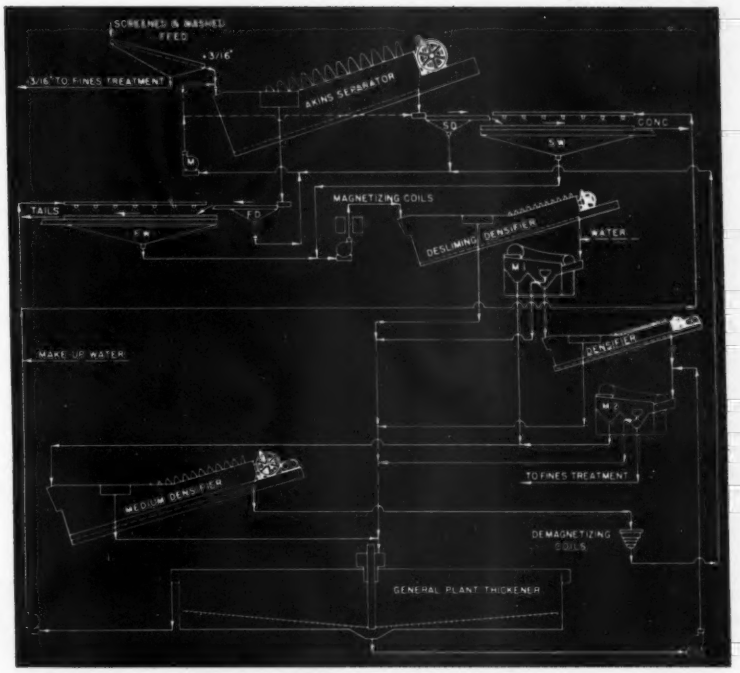


Fig. 2. The new and revised circuit (see legend)

As a result of the small-scale tests it was decided to try a large Akins of the same feed capacity as the cone. This was done during the 1945 ore season in another plant. Under parallel feed conditions this classifier produced a higher grade concentrate with a lower tailing than the cone. All of the expected mechanical advantages were realized with the large machine and the classifier went through all the regular plant shutdowns without having the tank completely drained. The machine required a minimum of attendance and demonstrated its ability to absorb any surge in feed.

Operation as a Separator

The feed and overflow arrangement of this separator is indicated in the flowsheet, Fig. 2. It will be noted that the feed enters at the deep end of the pool and the float overflow is taken off at one side. This is contrary to the usual method of operating a classifier and there are reasons for the arrangement. The principal advantage to this method of operation is that the flow of medium and the motion of spiral are in the same direction and eddy currents are thus avoided. Another advantage is that the sink product has to travel the entire length of the tank bottom before it emerges from the pool. This time interval permits final separation of trapped float material that sinks with the heavy product.

Specific gravity differentials exist in the pool. Generally speaking the gravity of the medium increases from feed point to the shore line and from top to bottom. The specific gravity is also higher on the side toward which the spiral is rotating upward. The degree of differential in the directions mentioned varies with the condition of the medium; a clean, quick-settling medium will show greater gravity differentials than a dirty medium.

Elimination of middling from the sink product is caused by the high specific gravity of medium at the shallow end of the pool. The material is not heavy enough to sink at this point, therefore it builds up in the pool until it is forced out with light float material. The elimination of the middlings is also partly accomplished by the "run-back" of heavy medium that drains out of the concentrate bed and carries middlings with it.

Power Saving is Indicated

It is impossible to give an accurate figure for the net power saving that may be realized by this operation because power input to the air compressor and cone scraper drive have not been determined for any cone installations. However, in the 1945 test the 78-inch Akins drive required about 15 horsepower input for an average load of 200 long tons of concentrate per hour. The ratio of medium to concentrate in the spiral dis-

charge was probably around one to one. The ratio of medium to concentrate in the air-lift discharge is generally about four to one, which means that about three times as much medium must have been recirculated in the cone operation. Inasmuch as the head on the pump is something over 20 ft. and the medium has a specific gravity of around 3.0 the power requirement for the two conditions is considerably different.

It may not be possible, however, to realize all of the apparent advantages of the spiral classifier so far as medium circulation is concerned. Particularly when a spiral replaces a cone, the drainage and washing screens may be in the wrong position for gravity flow of the concentrate to the screens. Also, under certain conditions, the medium in the concentrate may be too thick to drain properly on the screen, in which case it may be desirable to pump a small amount of medium on the concentrate before it reaches the drainage screen. This will permit better recovery of medium by the screen and prevent an excessive load in the medium cleaning circuit. For this reason an optional flow is indicated from the discharge of pump (M), Fig. 2.

In consideration of all the foregoing a conservative estimate of the Akins' advantage in power consumption is that it would at least be equal to that consumed by the air compressor in the cone circuit.

The Thickener

Fig. 1 shows two thickeners and it is with the wash water thickener that this discussion is concerned. The function of this equipment is to dewater as much as possible the undersize product from the sink and float washing screens and thereby reduce the volume of feed to the magnetic separators. Certain disadvantages of the thickener for this application have led to substitution of a special densifier.

The underflow from the washing screens may contain ore particles as large as 3 mm. or approximately ⅛ in. Under no conditions should material of this sort be considered as feed for a thickener. Partly because of coarse material in the thickener feed and partly because of the settling properties of ferrosilicon it is necessary to use a centrifugal pump on the underflow line and maintain considerable velocity in the line to the pump. Those conditions can be satisfied and the arrangement is operable for treatment of clean ores assuming, of course, that oversize rocks never get into the thickener.

When, as often happens, the crude ore contains large amounts of sticky clay that is difficult to remove on preliminary washing screens, the thickener is responsible for considerable trouble in the medium cleaning circuit. To maintain sufficient velocity in the thickener underflow line the discharge must necessarily be of high dilution, and if the thickener feed contains fine slime a considerable proportion of the material will report in the thin underflow and go to the primary magnetic separator. Magnetic separators are not designed for desliming under severe conditions and the magnetic product will retain enough slime to cause a serious build-up of the material in the plant medium if a slimy feed condition persists.

Another disadvantage to the thickener for this application is that a surge of circulating medium to the cleaning circuit is quickly reflected in an overload on the thickener mechanism. It follows from this that under some conditions medium cannot be removed from the circuit as rapidly as it is required in the separator.

The above considerations led to an experiment in which the wash water thickener was replaced by a spiral classifier that had been altered to operate as a densifier. Results were very satisfactory because the product from the densifier was almost completely deslimed and consisted of little except clean ferrosilicon and coarse non-magnetic material that had passed the sink and float washing screens. One of the advantages of the arrangement was that the material was dewatered to a small volume which made it possible to regulate the dilution of the magnetic separator feed. The relatively small volume of densifier product results in longer residence in the magnetic separator. Another advantage to the densifier was that it was immune to tramp oversize in the feed and was likewise indifferent to power interruptions. The biggest advantage lay in the possibilities of segregating slime for separate magnetic treatment as illustrated in Fig. 2.

In extreme cases of slime contamination it would be possible to discard part or all of the general plant thickener overflow and if this were done the only slime returning to the circuit would be in the thickener underflow with the small amount of ferrosilicon that escapes the densifiers and magnetic separators.

The Secondary Magnetic Separator

Standard practice has been to operate the magnetic separators in series with a small secondary to retreat the spigot discharge of a larger primary. The primary recovers most of the medium but the secondary (as shown in Fig. 1) must treat almost the same volume of feed under more unfavorable conditions. The ratio of magnetics to non-magnetics in the feed of the secondary is low and on account of its smaller size the velocity of pulp through the machine is relatively higher than in the primary.

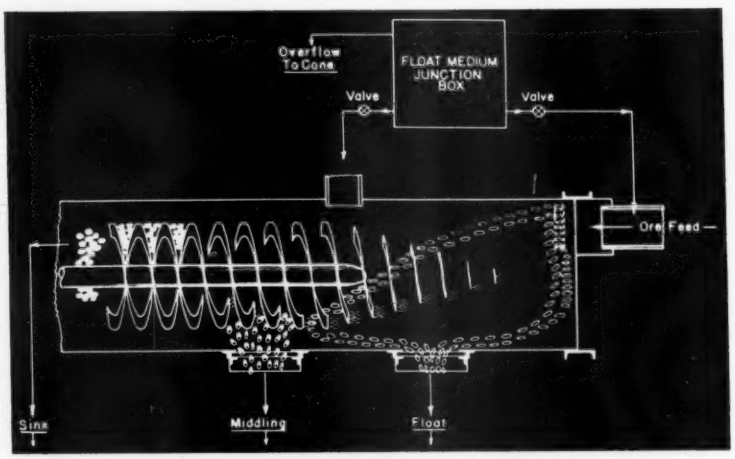


Fig. 3. General arrangement of the separator

Medium is lost from the circuit in three principal places; on the float and sink products, and from the spigot discharge of the secondary magnetic separator. With the thought of minimizing the loss from this last point a small densifier is installed in one plant as shown in Fig. 2, with the exception that an additional separator was installed as a tell-tale to get an idea of the loss from the spigots of the secondary machine. No comparative tests were made with and without the densifier in the circuit but inasmuch as the tell-tale separator showed practically no recovery the assumption is that the use of the densifier was justified.

It might appear that the addition of one more piece of equipment complicates the flow sheet unnecessarily

but the reasons for dewatering the spigot product of the primary are sound and the fact remains that the loss from this point in many plants is serious due largely to the installation of a secondary magnetic separator that is too small. Ferrosilicon medium is an appreciable item of cost and the elimination of apparently insignificant losses can add up to sizeable savings in a short time.

Middlings in Crude Iron Ore

Previous mention has been made of the fact that "middlings" overflow with the tailing or float material in iron ore treatment and that the Akins Separator was more effective in eliminating this material than a cone separator. It is desirable to reject this material as tailing because the middlings carry enough silica to render the concentrate unfit for sale if they report as a sink product.

A definition of what constitutes a middling product depends a great deal on the character of the material and also upon the process that produces the middling. A common conception of a middling is that of a mixture of valuable mineral and gangue that may be crushed to the point of liberation and retreated. However, a middling produced by this process is a material whose apparent specific gravity is close to that of the separating medium, at the point of separation, and the process is indifferent to the mineralogical character of the material. To be specific, the middling may be a combination of attached coarse hematite and gangue, primary taconites which require fine grinding for mineral liberation, porous hematite of good grade that floats on account of low apparent gravity, or paint rock which may be high in iron content but still light enough to float.

Of the four classifications mentioned above only the first could be recrushed and further beneficiated by the heavy-media process. Concentration of the other varieties of middling will depend upon processes yet to be perfected.

Recovery of Middlings

In pilot operation on a lead-zinc ore, in which nearly 70 per cent of metal recovered was in the form of a middling, it was demonstrated that the Akins Separator could recover the middling as a separate product in addition to producing a heavy sink concentrate and a light float tailing. The general arrangement of the separator when operated in this manner is shown in Fig. 3.

This development opens up the possibility of treating certain types of crude ores from which a proportion of shipping grade concentrate could be produced and the middlings segregated for separate treatment.

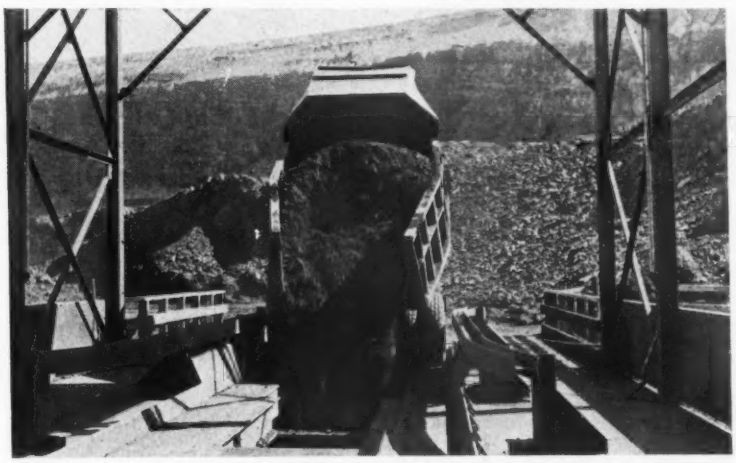
Treatment of Finer Sizes

The process has been limited in iron-ore treatment to plus 3/16-in. material. Separations have been made at a bottom size of 1/8 in. but only for short runs. Experiments with several types of separating vessels have indicated that the lower size limit may be considerably extended so far as the vessel is concerned but the problems of economical screening at finer sizes and recovery of the additional medium that will carry over to the medium cleaning circuit with extension of the size range remain to be investigated.

Work is being done with other processes for the treatment of finer sizes and at the moment it appears that the competition in this field will result in constructive developments.

Acknowledgment

The developments described are the result of cooperative effort between the manufacturer and the operator and the major share of the credit belongs to the individuals who keep the plants in production. Acknowledgment is therefore made to the staffs of Butler Brothers and Cleveland Cliffs Iron Company as well as to many individuals of other organizations whose interest and suggestions have been of great value.



Treatment of intermediate iron ores from the Mesabi Range is receiving increased attention

Labor and Economies in Coal

(*Continued from page* 35)

thousand men in Central Pennsylvania coal fields furnished the following startling information. Eighty-six per cent of the total employes had not finished high school. Thirteen per cent had actually graduated from high school and a scant one per cent had college training. This survey included complete organizations from the janitor in the mine office, the mine workers, and the superintendent at the mine. It also included the president of the companies and their staffs.

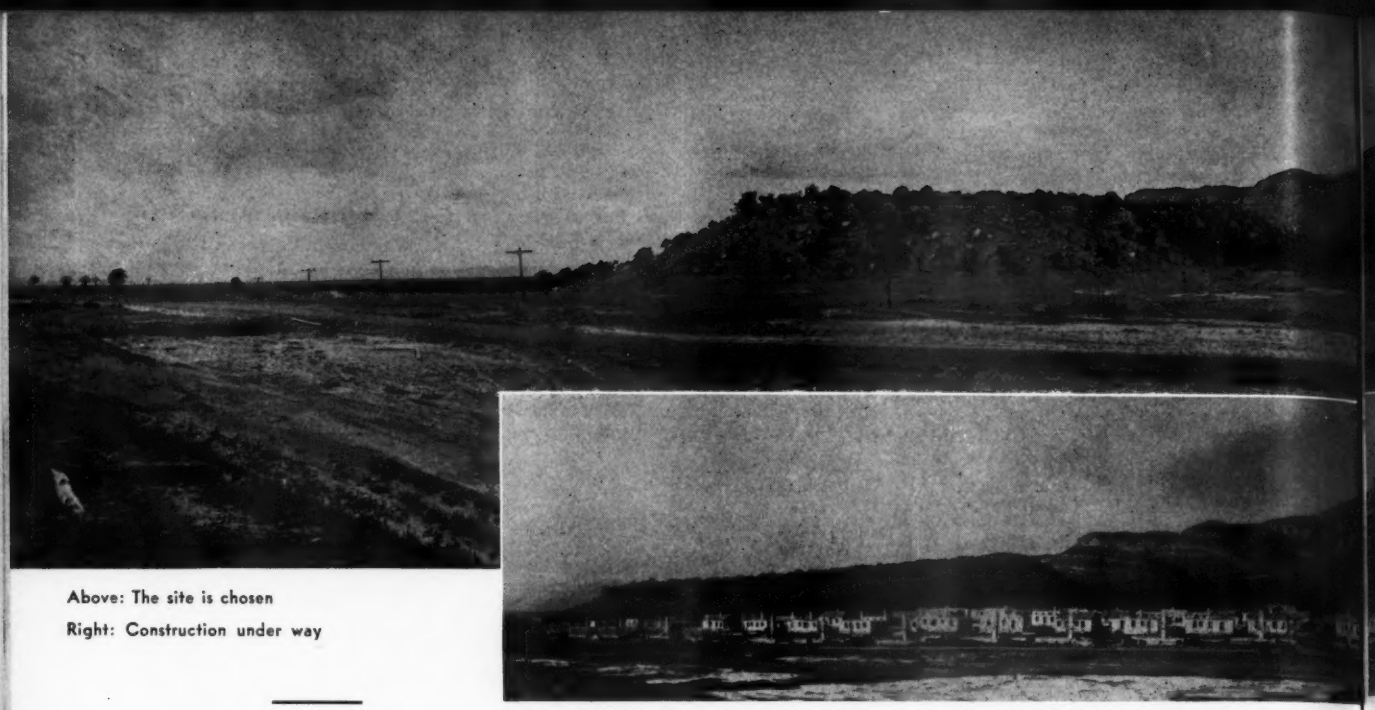
Imagine any other industry today having only one per cent of its total employes with college training. How can the coal industry possibly exercise good supervision, promote better thinkers in and around the mine, and, most important of all, convince labor that management does have a problem that directly affects the ability of labor to earn its highest possible standard of living?

Of course, it can properly be argued that we can't expect a well-trained college man for every position. I am reminded that during the war in attempting to defer men in occupations that we thought were quite skilled General Hershey's reply was that in 18 months the Army could train men to operate B-29 bombers. The coal industry must see that its new men coming into the industry are given some sort of job training and this training be made sufficiently attractive to high school graduates, so that they will want to come into the industry.

Another difficulty is the college man. At one large university, it is reported that not a single mining engineer is taking a job this year with a coal company to go to work underground.

Because of these difficulties, it is evident that the coal industry must not only undergo a revolution in terms of methods and equipment, but it must also undergo a revolution in terms of managements relations to its supervisory and laboring employes.

The time to begin is now!



Above: The site is chosen

Right: Construction under way

SUNNYDALE—

MANY months prior to America's entry into World War II, it became apparent that an expanded steel industry, particularly in the West, was essential to the nation's defense and that this expanded steel industry required the greatly increased production of coking coal. Accordingly, the head men of Utah Fuel Company, including Moroni Heiner, president; Claude P. Heiner, vice president and general manager; the directors and others launched a well-conceived plan to rehabilitate the company's No. 1 mine at Sunnyside, Utah, a former operation originally opened in 1900 which had since become all but a ghost town.

The job of rehabilitating Sunnyside's No. 1 mine was initiated and then early in 1942, shortly after America's entry into the war, Utah Fuel Company leased its No. 2 mine at Sunnyside to Kaiser Company, Inc., and this mine was rehabilitated for production of coking coal for the steel plant then being erected at Fontana, Calif.

Would Modern Housing Pay?

Obviously, the reopening and operation of two large mines, which had been all but closed down for more than a decade, would require additional miners and additional housing. The question confronting the men of Utah Fuel was: should we build some temporary wartime shelters amid the few old houses still standing on the old Sunnyside town site? Or, should we build a new town with modern utilities, modern houses and modern conveniences?

The men of Utah Fuel were not new in the coal business. They knew that the old-time miner's house was four walls and a roof, with or without plumbing, mostly without, and that many miners were accustomed to such dwellings and used to paying $8 to $12 monthly for them. But the decision was nevertheless made to build a new and modern housing project.

The Utah Fuel Company was convinced that good modern housing, comparable to that found in an up-to-date city, would prove beneficial, both to the miners and the company. It was reasoned that good housing might be the means of attracting the highest type coal miners and that such housing would eliminate some of the objections which a family might have for living in an isolated location, in this case 27 miles southeast of the nearest sizable city, Price, Utah.

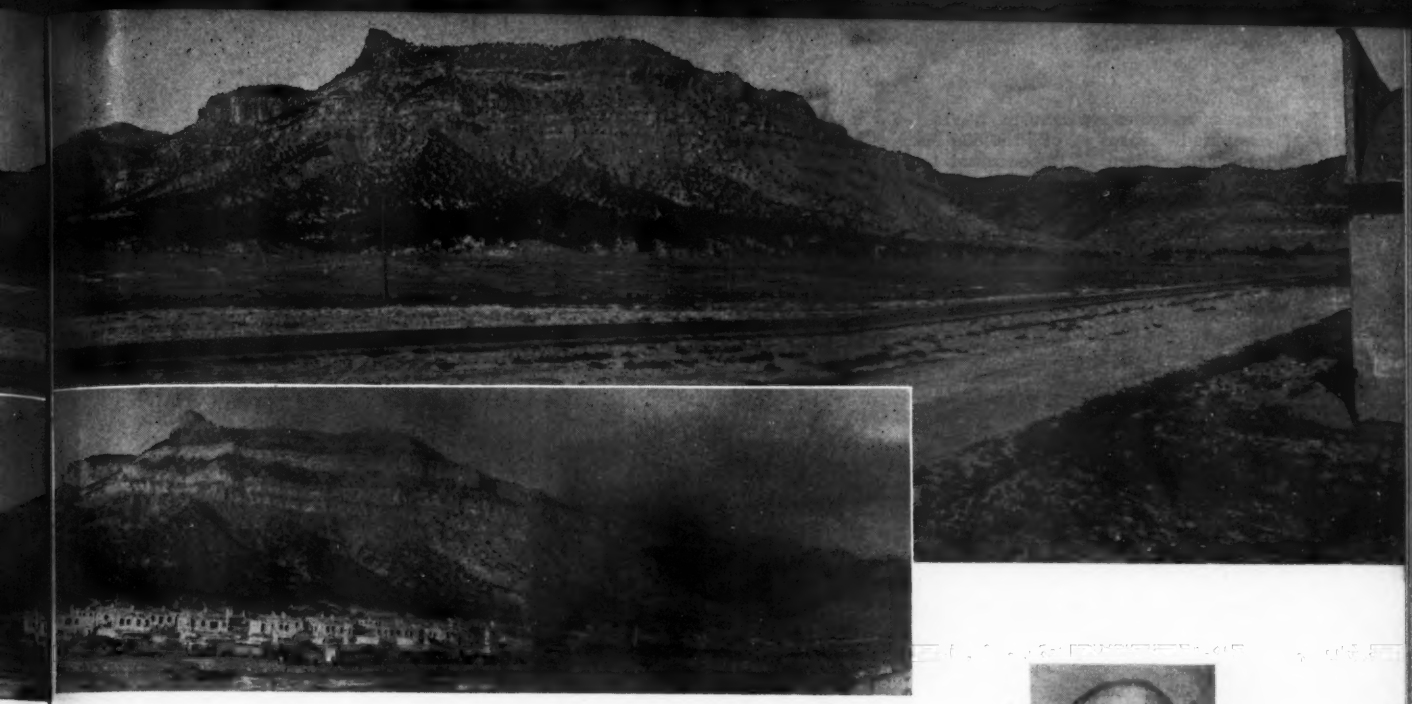
Much thought and study was given to the type of housing which should be built. Economy cried out for multiple-unit structures, such as apartment houses and terraces. But there was an aversion against anything that resembled a tenement, and besides, these planners wanted to provide living conditions which would give the miner and his family more freedom, privacy and pride of possession than were possible with multiple units.

As a result of these deliberations a new city was born, first in the minds of Utah Fuel's top executives, then on the drawing board of a well-known architect, and finally on a site about one mile from the old town of Sunnyside outside the canyon, exposed to the sun's rays and giving a splendid view of Carbon Valley. It was called Sunnydale, the first completely modern self-contained town to be completed by any coal-mining company in the West.

Building a city even in days of astronomical figures, construction miracles and Herculean industrial feats, is no small job. Consequently, Utah Fuel Company formed a subsidiary called Sunnyside Improvement Company and set up an organization designed and devoted to providing living conditions of a type seldom offered coal miners in out-of-the-way places.

Housing Administration is Organized

The author of this article was made manager of the Sunnyside Improvement Company and an office was established separate from the mining office. This separation of offices was designed to keep the housing management in close contact with the properties and tenants and to relieve the mine management of many of the vexing and often complex problems



A Model Mining Town

By W. C. WALKER
Housing Manager
Utah Fuel Company

The Utah Fuel Company Conducted a Housing Experiment Costing the Better Part of Two Million Dollars. Now After Approximately Four Years of Trial, the Story of the Experiment Can be Told and the Results Appraised in Proper Perspective

of housing. Experience proved this division of offices to be very advantageous, and it has been continued since completion of construction. From top man down to the most menial hand, men associated with the housing development were chosen for their capabilities in this specialized field.

A complete construction office was necessarily installed at Sunnydale even prior to the construction of the houses. The office detail was under direction of R. D. Pomeroy, vice president-auditor, Utah Fuel Company. Weekly payroll checks were issued to everyone working at the project.

Purchasing of materials for the homes was under general direction of Joseph Parmley, vice president-purchasing agent of Utah Fuel, who also directed the efforts of the expeditors working with the contractors.

It was decided to have 240 new homes. But before these could be built, temporary housing had to be provided for the home builders and those rehabilitating the mines. It was no easy job to provide living and boarding accommodations for the 500 men needed in the construction work. A number of tent houses with board floors were set up and 50 two-room cabins thrown together out of rough lumber. These and a number of privately-owned trailer houses answered the temporary housing problem. The old amusement hall, which had not been in use for many years, was reroofed and converted into a kitchen, dining hall and commissary. Four hundred men could sit down to a meal at the same time.

The Building of a City

The contract to build Sunnydale was let to MacIsaac, Menke & Pozzo of Los Angeles. Miles E. Miller was retained as the architect, and the firm of Caldwell and Richards did the engineering work. The plans for the entire project was submitted to and approved by the Federal Housing Administration and conformed to their standards. Gordon H. Weggeland of Salt Lake, State Director of F. H. A., and his organization actively participated in the planning of the project. The preliminary work was completed during the late summer and fall of 1942 and then in October of that year the real job of building the city of Sunnydale got under way.

The layman seldom realizes what is entailed in building a city from scratch in a near-wilderness. Even the little matter of water can become a major problem and a major project.

In the case of Sunnydale, a virgin mountain stream was tapped in a valley seven miles and one high mountain range away. The water was

piped into the new town site and stored in three reservoirs having a combined capacity of 750,000 gallons. State Health Department tests showed this water to be pure but, to make doubly sure, a chlorinator was installed. Next came a modern sewer system with a septic tank large enough to handle waste from the entire town. The electric power was obtained by connecting to the Utah Power and Light Company's distribution system.

Streets were laid out artistically to conform to the contour of the low, rolling hills on which the site was located. They were surfaced with gravel and edged with concrete walks and built-in gutters.

Individual lots were laid out with minimum dimensions of 50x100 ft. Many were much larger. Then the houses were erected.

Variations in Design of Homes

To achieve efficiency in planning and construction without getting a stereotype form, the houses were planned on seven basic designs, which were reversible and susceptible to different treatment for porches and trimmings. Off-line streets also helped to give individuality. Two hundred five of the 240 houses were to be one story with living room, two bedrooms, a complete modern bathroom with tub, wash basin, medicine cabinet and toilet, a kitchen with ample cabinet and cupboard space with utility room for laundry purposes attached. A hot water tank in each bathroom was readily attachable to the tenant's kitchen range by pipes installed through the wall.

The other 35 of the houses were to use approximately the same floor plan but with basements in which the laundry facilities were installed and in which two sleeping rooms were to be finished. All houses were insulated with a blanket type insulation placed in the ceilings, floors and all exterior walls. Floors were of $^{25}/_{32}$-in. tongue-and-grooved finished oak boards. Walls were of lath and plaster, and the interior wood trim was of an attractive molding.

Light fixtures were of modern design and the basic wiring made provisions for electric ranges and other electric devices. Wall switches and electric outlets were conveniently placed, and such refinements as special electric door bells and electric razor outlets were included.

The exterior painting design was varied to further do away with any one-type appearance. Two hundred five of the houses were to have garages with overhead doors and cement strips leading to the street. In a nutshell, every one of the 240 houses in the new city of Sunnydale was to be as modern as possible, attractive and individual, and as sturdy as hardwood and concrete could make them.

In the case of concrete for foundations, it was discovered that coke breeze, which is in abundance at Sunnyside, made excellent aggregate, showing compressive strength tests of as high as 1,650 lb. per square inch. All of the houses were of frame construction using either redwood siding or various colored shakes for the exterior finish and cedar shingle as for roofing.

The work was laid out in a streamlined manner so that various mechanics and carpenters could go from section to section with no delay and without interfering with other parts of the work. A central carpenter shop and planing mill was equipped with power saws and tools. A special mill for forming and setting doors and windows was put in operation. A complete plumbing shop was established from which the water and sewer lines were shaped and installed. Mechanical diggers excavated the trenches.

The homes have spacious and attractive living rooms

What Was Done in Six Months

Due to the war urgency, materials and supplies were none too easy to get, even with high priorities. An expediter worked directly with the War Department and several modern miracles were accomplished.

First excavations were made in 1942. The first houses were occupied on February 10, 1943, less than four months later. Practically all of the houses were ready within six months from the time work was actually commenced. The remarkable speed with which this project was completed, in spite of early wartime difficulties in obtaining labor and materials, contributed materially to the success of the enterprise.

No pains were spared to make Sunnydale attractive, livable and modern, even to the most intimate detail. Yards were all graded from the rear house line to the streets and lawns were planted in every yard. A basic planting of trees was made and contests were conducted in which substantial prizes were offered to the tenants who did most to beautify their grounds by further planting of trees and shrubs.

Regular weekly garbage pickup service was provided by the company at no cost to the tenant. Everything was done to encourage the tenant to care for his home and the premises in general, as though they were his own. Shortly after the first houses were occupied, "A Family Letter" was initiated. Later it became a monthly publication printed and distributed by the management to emphasize the value, to both company and tenant, of exchanging ideas and caring for the property.

All sorts of suggestions were made on how to care for the plumbing in freezing weather, on care of the oak floors, cleaning of the walls and woodwork, care of shades and blinds, and doing the other things necessary to keep up a modern house. The men of Utah Fuel realized that some of the miners and their families who had not before occupied houses with such modern conveniences, would need a helping hand in the care and use of their new homes.

The Transportation Problem

The new city of Sunnydale was located an average distance of 1½ miles from the Sunnyside mine portals and was about a mile from the old town of Sunnyside, where most of the store and civic facilities were situated. During the period of gas and tire rationing, transportation was a problem. To cope with it the company purchased a bus and instituted a service which made round trips at each of the mine shift changes and

made regularly scheduled additional trips to the shopping center and theater. The round trip fee was nominal, 10 cents. Then a branch of the company-owned store at Sunnyside was put in a central location in Sunnydale carrying luncheon meats, groceries and essentials, thus saving housewives many trips to the uptown shopping center.

Recreational Facilities

With the nearest town offering organized recreation facilities 27 miles away, it was apparent from the start that the community's entertainment would have to be furnished in the community, and to a great extent, by its own residents. As the president of Utah Fuel wrote the housing manager, "A man doesn't want to spend all his off-shift hours in a house—even in one of your nice Sunnydale houses—so bear down on the entertainment idea and provide facilities for recreation." Accordingly, a welfare association was organized with the active help and encouragement of the local unions, to the support of which both the men and company contributed.

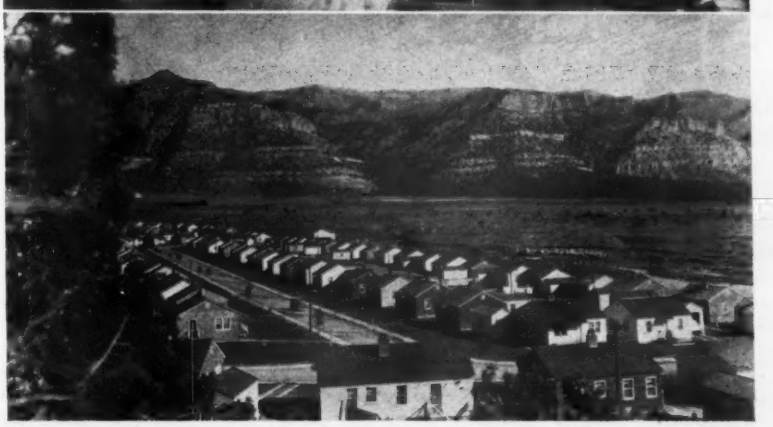
The association is directed by elected representatives from the unions and a representative of the company. Through this association, and with the liberal use of company personnel and equipment, much and varied entertainment has been provided. For instance: there is one free picture show each week and one free dance each month. Boy Scout troops have been organized and a mountain camp ground improved. Baseball and basketball teams were formed and provided with equipment and playing facilities. Tennis courts and recreation grounds were built. Financial and moral help were given to other organizations. Celebrations were arranged for Fourth of July, Christmas and other holidays. Clubs were formed, including the Book Cliff Club, which sponsored a library for free use of employes.

Rentals of the new Sunnydale homes were set at $30 to $33 per month on the four-room houses and $40 on the larger six-room houses. Though these rentals were low compared with similar homes in urban areas, it was understandable that some miners thought them too high. It was a big jump from the $8 to $12 per month which some of them had been paying and so, despite their high wages, some of the miners, at the outset, chose to live in the old-time low rent buildings; vacancies in the new Sunnydale town were high.

However, there has been a steady and definite trend on the part of the miners to move from the unmodernized houses to the comforts and conveniences of the new ones. Today there are no vacancies at Sunnydale —there is actually a waiting list.

The tenants of this new city are taking pride in caring for their modern surroundings. They have learned, too, that mistreatment of homes and premises increases the cost of maintenance and repair. Sunnydale is fast becoming a stabilized community. The $2,000,000 experiment has been well justified. Better housing has made for more efficient and more contented workers.

It took only six months for Sunnydale to be built, but it has taken four years for it to grow up.



Above: Lawns and shrubs were planted as part of the landscaping plan

Right: The recreation program takes advantage of local talent in a variety show at the theater

Below: Cedar Street, a broad avenue traversing the town

A HABIT TO JOE...

"NEW IDEA" TO HIS NEPHEW

...YET BOTH WANT THE SECURITY your P.S. Plan Provides

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MINING CONGRESS JOURNAL

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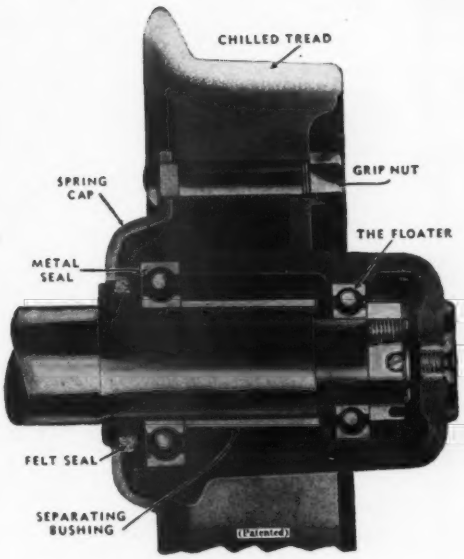

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All moving parts of the Pneu-Motor feed are enclosed in oil and consolidated in the Drifter, making a single compact unit . . . Simple spur gears, instead of old-fashioned internal or planetary types . . . No ratchets, pawls or springs . . . Only one air hose . . . Pneu-Motor easily dismantled without taking Drifter apart . . . *Standardized mountings take all three sizes of WPM Drifters.*

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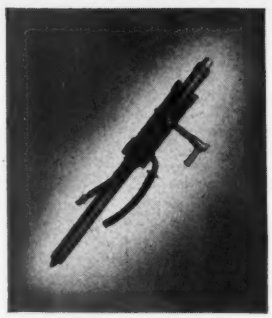
Here's unbeatable performance that pays off in faster drilling cycles, more footage with less effort, and all-around operating economy. That goes, too, for the other new Blue Brute Drifters — the WPMS (Pneu-Motor on shell) and WHC (Hand Crank) types. Each type comes in three cylinder sizes — 3", 3½" and 4" — covering the whole range of drifter jobs, yours included, in a way that proves *there's more worth in Worthington.*

Write for literature describing the complete line of BLUE BRUTE Mining Equipment, including Drifters, Stopers and Hand Held Drills. H7-1



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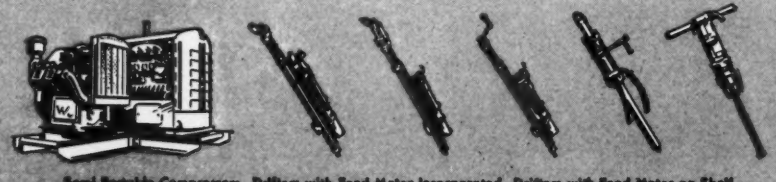

Semi-Portable Compressors. Drifters with Feed Motor Incorporated. Drifters with Feed Motor on Shell. Hand-Crank Drifters. Stopers. Hand-Held Rock Drills.

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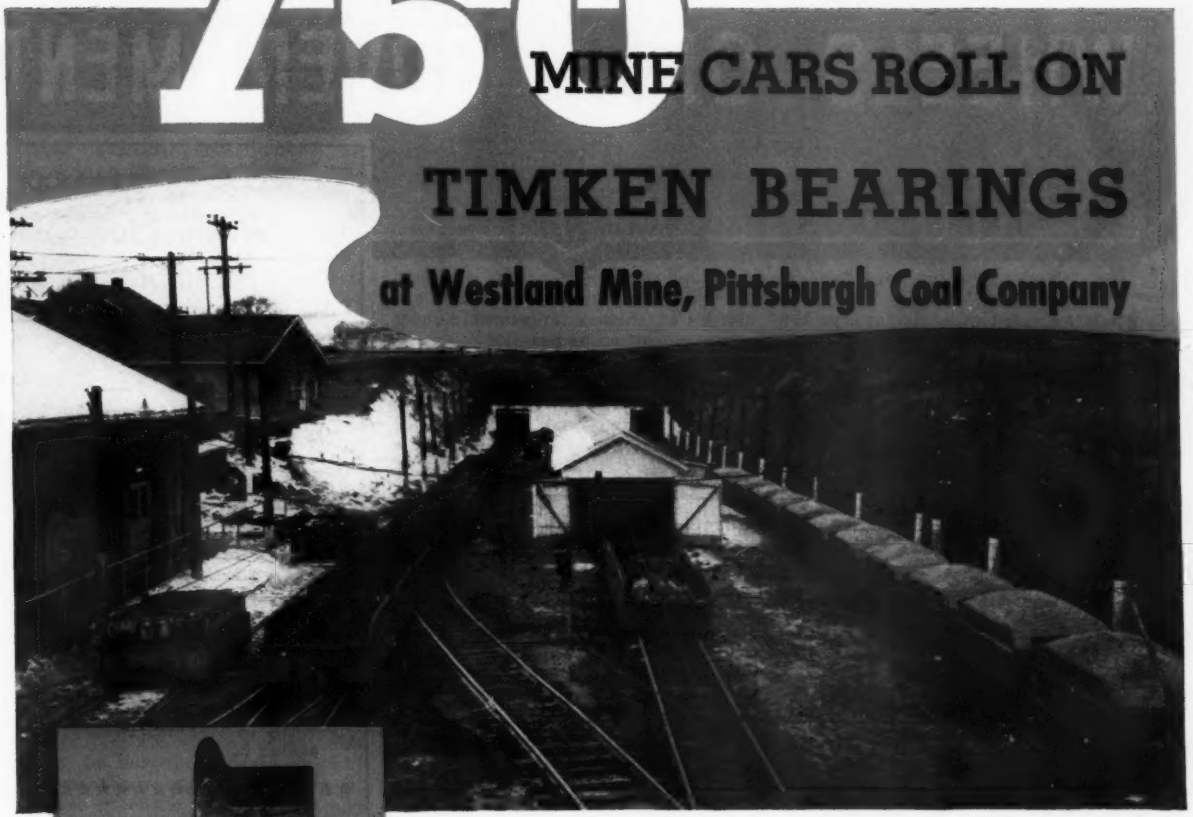
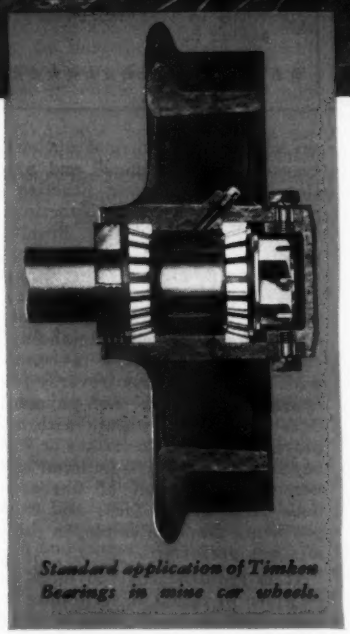
at Westland Mine, Pittsburgh Coal Company





Standard application of Timken Bearings in mine car wheels.

Coal haulage at the Westland Mine of the Pittsburgh Coal Company is on a 100% Timken Bearing basis; 750 mine cars are in service here — all equipped with Timken Tapered Roller Bearings.

The first 500 cars went into operation in November, 1939; the remaining 250 cars were placed in service two years later. They are all-steel cars of the stub axle type, with a capacity of 198 cubic feet level full. All the cars were built by Carnegie-Illinois Steel Corporation, Johnstown, Pa.

Bearing performance has measured up to the best expectation of the mine operator and no bearing failures of any kind have been reported. Does it pay to operate Timken Bearing Equipped mine cars? More than 1,000 mine operators have proved it does — handsomely. They get out more coal per shift at lower cost per ton hauled.

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WHEELS OF GOVERNMENT

Washington Highlights

CONGRESS: Swinging into the home stretch.

PORTAL-TO-PORTAL: Now law.

LABOR BILL: To White House.

TAXES: Reduction bill on President's desk.

COAL: Contract negotiations falter.

ST. LAWRENCE: Another drive for approval.

STREAM POLLUTION: Bills opposed by mining witnesses.

PREMIUM PRICES: Russell bill to House floor.

FERTILIZER PROGRAM: Would put Government in business.

MINING IN STREAMS: House passes Bartlett bill.

FOCAL point of conjecture, as the first session of the 80th Congress rolls on toward its close in late July, is the coming White House action on the Income Tax Reduction Bill and the Federal Labor Relations Act of 1947—what will the President do? If he vetoes, will the Congress override?

Night sessions and Saturday work are the order as Congress crowds toward the completion of its program. Active in varying degree are measures dealing with export controls, RFC extension, the military merger, health insurance, Fair Employment Practices Commission, housing, St. Lawrence Seaway and Power Project, increased minimum wage, water pollution, and a Government fertilizer program.

Of the supply bills for Federal departments and agencies, six are through the House and two through the Senate—out of 12 that must be enacted by July 1. Major controversies are anticipated over the appropriations for the Departments of Interior and Agriculture.

President Approves Portal Bill

On May 14 the President's signature made the "Portal-to-Portal Act of 1947" law. So ended, for the time at least, the series of legal battles which had surged from far Alaska to Florida and been carried up to the Supreme Court, after tremendous cost to all industry and the American taxpayer.

In approving the Act the President, in a message to Congress, stated that in the interest of economic stability "it is essential to clarify this matter by statute." The message continued by saying that the Act should end uncertainty with respect to billions of dollars in claims for back wages covering activities which "had not previously been considered by either workers or employers to be compensable." The President pointed out that the Act would help in the satisfactory conclusion of current wage negotiations; also that it does not disturb wage-hour claims based upon activities which were compensable under contract, custom or practice.

As discussed in our last issue, the Act not only invalidates pending portal-pay claims but protects employers against "hidden liabilities" for back pay and overtime under other features of the Fair Labor Standards Act of 1938.

An early test of the constitutionality of the Act is expected to be brought, through a suit against 19 steamship and stevedoring companies in a Federal District Court in San Francisco. Counsel for the employes has requested the court to rule on its constitutionality, with particular respect to the retroactive provisions outlawing portal pay suits.

Labor Bill to White House

On its way to the White House following approval of the conferees' report by heavy majorities in both the House and Senate, the "Federal Labor Relations Act of 1947" represents a definite compromise from the much stronger measure passed by the House on April 17. The Senate passed the bill on May 13 by a vote of 68 to 24. A real effort has been made by the conferees to formulate a bill which the President will approve, or on which a veto may be over-ridden by the Senate, in the event such action becomes necessary.

Although the House members of the conference made many concessions they feel that the provisions of the House bill spurred the Senate on to approval of a much stronger measure than would otherwise have been possible. In order to bring the bill out of conference it was necessary for the House conferees to drop their provisions outlawing industry-wide collective bargaining, giving private employers the right of injunction, abolishing of the present NRLBoard, applying the Sherman Act to boycotts, and regulating the internal affairs of unions.

In its present form the preamble of the bill sets forth certain rights of employers as well as of employes. It expands the present 3-man NLRBoard to 5 members, with a general counsel who shall have final authority in respect of the issuance and prosecution of unfair labor practice complaints. The Board's functions are made primarily judicial. Specified as unfair labor practices for unions are: coercion of employes in connection with union membership, or of an employer in the selection of his bargaining representatives; demanding discharge of an employe in connection with a union shop controversy for any cause other than non-payment of dues; refusal to bargain with an employer; resorting to strikes or force in boycotts or in jurisdictional controversies; assessment of unreasonable dues or initiation fees; and exacting payments from an employer for services not performed.

It is required that 60 days' notice be given of intent to terminate a contract, also 30 days' notice to the Federal Mediation Service, now made independent of the Department of Labor. All contracts are to remain in full force and effect during the 60 days and any employes striking would lose their rights under the NLRAct. The Board may use injunctive procedure against unfair labor practices and must expedite action against

jurisdictional strikes, secondary boycotts and strikes to force employers to pay for services not performed.

Although the closed shop is outlawed, a union shop is permitted when a majority of the employes eligible to vote authorize its establishment. Check-off of dues is subject to authorization by individuals concerned. Political contributions by unions in connection with any primaries or elections of candidates to Federal office are outlawed. Unions must file full information including revenues and expenditures, officer personnel, method of selection of officers, procedure in authorizing strikes, and restrictions upon membership. Officers of unions must file affidavits that they are not members of the Communist Party or the union will lose its protection under the NLRAct.

In strikes which would imperil the national health or safety, the President may instruct the Attorney General to seek injunctive relief, effective for 80 days. Meanwhile the President is authorized to appoint a special investigating board which shall make its report public. In accordance with the President's request the bill provides for a joint Congressional Committee on Labor-Management Relations, to conduct continuing investigations and to make legislative recommendations by March 15, 1948, with a final report by January 2, 1949.

Employers are relieved of any obligation to bargain collectively with foremen. Suits for damages are authorized in cases of breach of contract. Employer contributions to welfare funds are forbidden unless employes' benefits are specifically stated in writing, the fund subject to annual audit and employer and employe representation made equal in supervision of funds.

Tax Bill Up to President

The Individual Income Tax Reduction bill is on the President's desk, following approval of the conferees' report 220 to 99 by the House and 48 to 28 by the Senate. In the event of a veto it is extremely questionable whether enough votes can be mustered in the Senate to override. Known as the Knutson (Rep., Minn.) bill, the measure originally passed the House March 27, was reported in the Senate May 14 and passed the Senate May 28.

The bill provides personal income tax reductions as follows: (1) On net taxable incomes of $1,000 or less (after deductions and exemptions), 30 per cent; (2) a "notch" cut of $67 for net taxable incomes between $1,000 and $1,396; (3) a cut of 20 per cent on taxable incomes between $1,396 and $136,720; (4) a cut of 15 per cent on that portion of taxable incomes between $136,720 and $302,396; and (5) a cut of 10.5 per cent on that portion of taxable incomes above $302,396. Personal exemptions of individuals over 65 years of age would be raised to $1,000 from the present $500. The bill would be effective July 1 and provides for taxpayers to take only half of the percentage cut in their final return in March, 1948, with full cuts applying in subsequent years.

A Ways and Means subcommittee has approved the freezing of social security taxes at 1 per cent through 1949 and increasing them to 1½ per cent in 1950 and 2 per cent in 1957.

George J. Schoeneman, a special assistant to the President, has been nominated to succeed Joseph D. Nunan, Jr., as Commissioner of Internal Revenue, effective June 30. Schoeneman has had previous service as Deputy Commissioner and Assistant Commissioner.

Coal Negotiations

The joint conference of Northern and Western coal operators and UMWA representatives "adjourned by joint assent" May 31, when the mine workers insisted upon a wage increase of 35¢ an hour. Spokesman Charles O'Neill stated that the mine workers asked for an 8-hour over-all day, portal-to-portal, with a 30-minute lunch period to be paid for and during which work would be suspended. This compares with the present 9-hour day which has a 15-minute lunch period that is paid for but during which mine operations do not cease. The demand of the miners would reduce work time at the working place from 8 hours (taking one hour as travel time, as found by the President's Commission), to 6½ hours of actual work.

The proposal of the operators was to pay for 8 hours with an increase on the basis of the national pattern; the basic rate for the basic man is $1 an hour, plus the Krug-Lewis 18½¢ additional, which makes the base rate $1.185—to which the operators suggested an additional 15¢, giving a rate of $1.335 an hour instead of the $1.185 per hour. The mine workers refused this offer and demanded a rate and a shortening of hours which would amount to $1.535 per hour, bringing the total take-home pay for 1½ hours less work to $13.05 as contrasted with the $11.85 per day for 9 hours under the Krug-Lewis Agreement. Operators estimated the increase in cost of production under these hours and wage demands at about 70¢ a ton "plus some other collateral demands of which we can't estimate the cost at this time." O'Neill stated that the mine workers asked for an increase in payment to the union welfare fund from the present 5¢ to 10¢ a ton, and for appointment by the UMWA of two of the three trustees. The operators were apparently willing to include the Federal Mine Safety Code in the contract as it now stands, with a joint Safety Committee of two miners and two operators to be created with authority to select an umpire in event of disagreement.

The operators proposed that the contract run from July 1, 1947, to April 1, 1949, but the mine workers demanded a contract subject to cancellation by either party on 30 days' notice.

Meanwhile Southern coal operators and mine worker representatives were continuing their separate contract discussions.

St. Lawrence Project

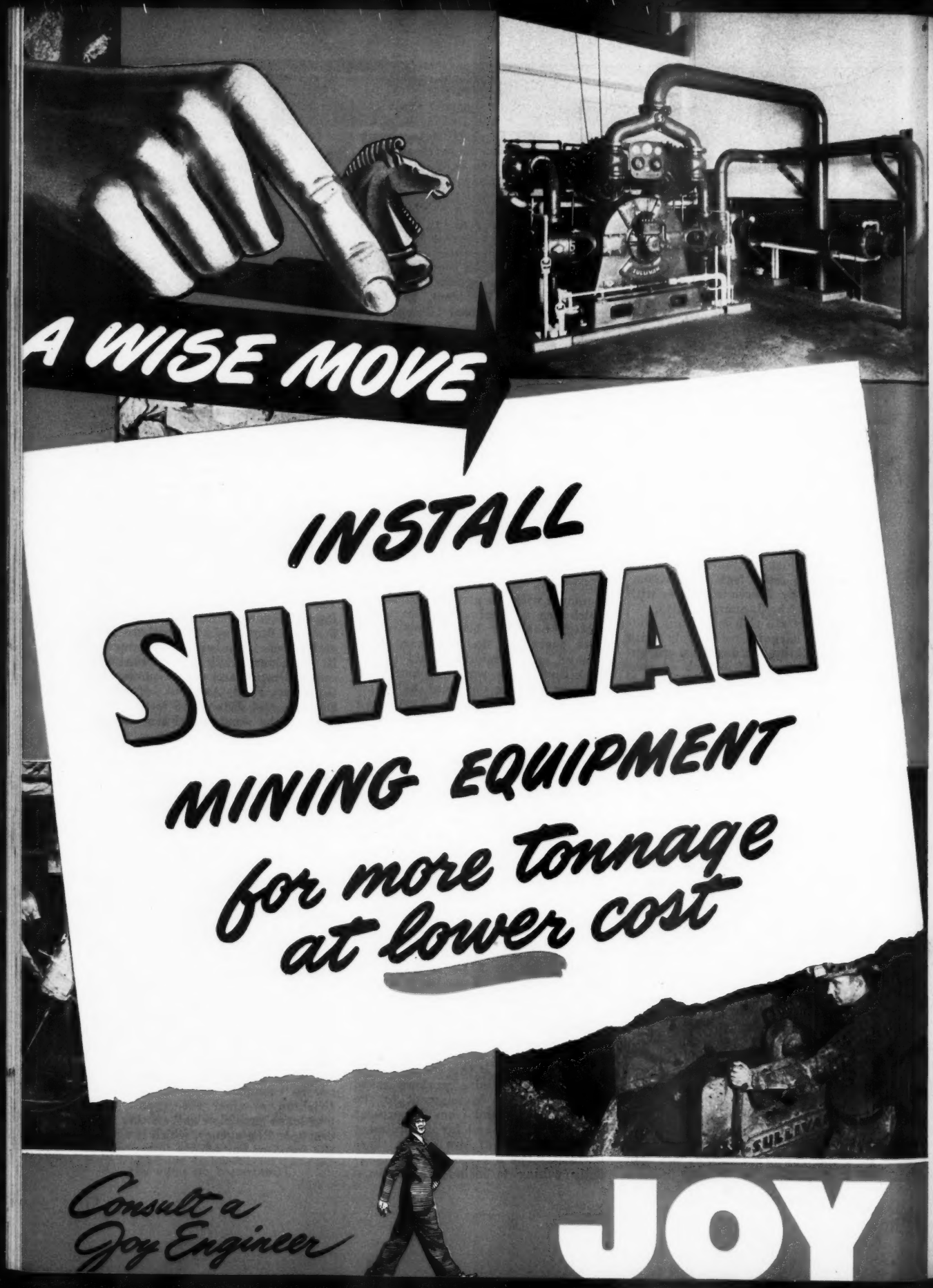
A new drive is under way to obtain Congressional approval of a joint resolution authorizing construction of the Great Lakes-St. Lawrence Seaway and Power Project, including the imposition of tolls to make the project self-liquidating. Hearings began May 28 before Senator Wiley's (Rep., Wis.) Foreign Relations subcommittee. Testifying for the project were Secretary of State George Marshall; former President Herbert Hoover; Federal Power Commissioner Leland Olds; General Wilby, chairman of the New York State Power Authority; Frank C. Barnes, of the Michigan-Great Lakes Water Commission; Under Secretary Kenneth C. Royall; Henry LaLiberte, of Duluth; F. Hugh Burns, of the Northern Federation of Chambers of Commerce; H. E. Ekern, chairman of the Wisconsin Deep Waterways Commission; Governor Fred Aandahl, of North Dakota; and Edward O'Neill, president of the American Farm Bureau Federation.

Army engineers estimate the project will cost above $500 million (based on 1939 cost figures). Opponents will begin testimony on June 11. The American Mining Congress will again state its opposition.

Stream Pollution

On May 28, Senator Malone's (Rep., Nev.) Public Works subcommittee closed the hearings which began April 22 on the Barkley-Taft Water Pollution bill, S. 418. Following the testimony of American Mining Congress witnesses, discussed in last month's JOURNAL, Andrew B. Crichton, president, Johnstown Coal & Coke Co., and Harry Gandy, National Coal Association, opposed the bill as giving the Surgeon General power to close down industries by Federal court action, and asked that the coal industry be exempt if any bill is passed. Crichton assailed the grants-in-aid and loans provision as "another Federal spending agency, which is against the trend of our efforts to reduce the

(*Continued on page* 93)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All Attendance Records Shattered At 1947 Coal Show

George H. Love, Pres., Pittsburgh Consolidation Coal Co., National Chairman, Program Committee and Banquet Toastmaster

AS the 1947 Coal Show drew to a close on the evening of May 15, coal mine operators, manufacturers, and their guests were unanimous in their opinion that the Cleveland meeting was the most successful that had ever been held. Aside from setting an all-time attendance record, the Convention and Exposition were a striking demonstration of the advances made by the American coal industry despite the difficulties of recent wartime years. Had the advocates of nationalization of our coal mines attended this gathering at the Cleveland Auditorium, they would have seen convincing evidence to refute their arguments—the strength of private enterprise and individual initiative in the coal industry was never more convincingly demonstrated.

A World-Wide Representation

With the official opening of the meeting on Monday morning, May 12, it became evident that registration records would probably be shattered before the week was over and by noon that day the Exposition floors and meeting hall were thronged with people. Thursday night when the convention closed, registration had reached a total of 8,962 persons, of which 4,373 were operators and 4,029 manufacturers. Guests and ladies totaled 560. This figure is 70 per cent greater than the largest pre-war attendance record held by the American Mining Congress coal meetings. Approximately 65,000 net square feet of exhibition space were used in the Cleveland Auditorium and 189 manufacturers were represented.

Unique in more respects than size and attendance, the presence of representatives from 29 different countries gave the convention an international aspect. A special delegation, accompanied by State Department officials, made the journey to Cleveland to secure valuable information on American coal mining methods. Visiting coal experts from Britain, France, Czechoslovakia, Poland, Turkey, Denmark, Belgium, Spain, Australia, the Union of South Africa, India, Mexico, Algeria and several South American countries viewed the exhibits and attended the meetings. Members of the House Labor Subcommittee on Welfare of Miners, headed by Rep. Max Schwabe of Missouri, also spent a full day at the Convention as guests of the American Mining Congress.

Splendid Work by Committees

The Program Committee, the various committees on arrangements, the Coal Division of the American Mining Congress, and the Manufacturers Division which sponsored the exhibits should receive the highest praise for the parts they played in the success of the Convention and Exposition. George H. Love, president, Pittsburgh Consolidation Coal Co., was National Chairman of the Program Committee which, with a roster of operators and manufacturers, had arranged an instructive series of papers on current economic and operating problems of the coal mining industry. The Manufacturers Division under the chairmanship of Thomas McNally, president, McNally-Pittsburg Manufacturing Corp., presented an outstanding display of the most modern mining machinery, equipment and supplies of all types. Also contributing largely to the success of the meeting was the work of the Welcoming and Entertainment Committee under the chairmanship of R. L. Ireland, Jr., president, Hanna Coal Co., with Forest J. Nelson, Macwhyte Co., as vice chairman for Welcoming, and Whitney Warner, Jr., president, Warner Collieries Co., as vice chairman for Entertainment. The Ladies' Committee, headed by Mrs. R. L. Ireland, Jr., arranged a most enjoyable series of luncheons and trips for the visiting ladies.

The Coal Division of the American Mining Congress under the chairmanship of Harry M. Moses, president, H. C. Frick Coke Co., presented a new feature on the Convention program. For the first time Committee meetings were opened generally to coal mine operators and manufacturers, and all who attended expressed enthusiasm for the constructive nature of these meetings and the informative discussions that took place. Contributing to the smooth operation of all the Convention sessions was the efficient work of the Floor Committee, headed by R. H. Morris, vice president, Gauley Mountain Coal Co., as chairman, with Cecil M. Guthrie, Hume-Sinclair Mining Co., as vice chairman for the strip-mining sessions.

Opening of the Convention

On Monday morning, May 12, the Convention was formally opened by Julian D. Conover, secretary of the American Mining Congress. Pointing out that it was six years since the Mining Congress had its last full-scale coal show, he went on to say: "When we look back we find that this meeting is also another kind of an anniversary. It was just 20 years ago, at our meeting in Cincinnati, in May, 1927, that the Convention adopted the slogan, "Mechanization—The Dawn of a New Era." At that time the industry had begun to recognize that mechanical loading of coal underground was not just a visionary ideal, but that it *was* practical and was destined to replace hand shoveling, and that the future of coal mining lay in the application of new and constantly improved mechanical equipment to every phase of mine operation." Pointing out that many of the forecasts of 20 years ago have since become realities, Mr. Conover stated that in spite of the war's interruption, progress has continued and that an inspection of the equipment on display would make it plain that it is going forward today with greater impetus than ever before. He predicted still greater efficiency and higher tonnages from men and machines throughout the mining cycle; wider application of full seam mining and increased ratios of fuel recovery through improved coal cleaning; increased extraction of coal through mechanical mining of pillars; improvements in coal utilization and increased recovery of by-products.

Stating that, with reasonable freedom from interference, the coal industry would continue to meet its future problems as it has those of the past, Mr. Conover pointed out that although wartime controls have largely been eliminated, the industry is still faced with uncertainty as to the action that may be taken by the Government in Washington on matters of the utmost importance to the industry's future. Mr. Conover mentioned, among other things, current proposals to change the basic character of the U. S. Bureau of Mines by thrusting police powers upon it; pending labor legislation, to curb the monopolistic power of labor leaders and restore true collective bargaining; and the tax reduction bill, needed to encourage capital investment for business expansion and maximum employment. He called for constructive action by Government to permit not only coal but industry as a whole to continue its forward march.

The chairman of the Coal Division, Harry M. Moses, made an address of welcome, stating that the American Mining Congress was proud of the participation of both coal operators and manufacturers in its work for the mining industry. He touched briefly on the splendid war record of the industry and emphasized the importance of future research and improvement in methods and equipment, together with continued progress and accentuation of the industry's fine safety record. Mr. Moses expressed sincere thanks on behalf of the Coal Division to all those who had assisted in the arrangements for the meeting.

Operators and manufacturers thronged the registration desks

On behalf of the manufacturers, Thomas McNally outlined how new devices, new implements, and further developments in the art of manufacturing were serving the coal industry. The improvements being made, he said, in many cases "do not originate with the manufacturer but they come from the men in the mines. Many of these ideas are initiated down on the loading machines and in the cleaning plants, and we, the manufacturers, wish to bear tribute this morning to the men of the mines who have aided the manufacturers in the perfection of such improvements and of the present-day equipment." Adding that equipment that is adequate today will probably be far from satisfactory tomorrow, Mr. McNally urged that operators and manufacturers devote more time to research and development of improved designs, bearing in mind that new equipment must meet three requirements: (1) safety, (2) economy of operation, and (3) a final product that will hold its own with competitive fuels.

Mr. Conover then presented program chairman George H. Love, who presided at the opening session. Charles J. Potter, assistant to the president, Rochester & Pittsburgh Coal Co., of Indiana, Pa., spoke on "Some Phases of Labor and Economics in the Coal Industry." This interesting analysis of an important subject is carried in full beginning on page 33 of this issue. Following Mr. Potter, E. R. Ambrose, air-conditioning engineer, American Gas & Electric Service Corp. of New York City, spoke on "The Heat Pump for Comfort Heating and Cooling." This paper, which was published in the May issue of MINING CONGRESS JOURNAL, was a thorough technical description of this new development which may revolutionize home heating and air conditioning; its presentation was followed by some extremely interesting floor discussion.

Sessions Well Attended

That afternoon and on the succeeding days, each session attracted a large attendance of operators and manufacturers, attesting to the serious study which the industry is giving to its problems. At the safety session Monday afternoon, a statistical analysis of accident records in anthracite and bituminous mining was presented with comparative records of other industries, showing the improvements in safety progress over the past years. Sources and causes of mine fires, with special attention to electric hazards, were discussed and recommendations were submitted for precautionary and preventive measures. Handling mantrips safely and efficiently in and out of the mines was also a timely subject that was heard with great interest.

At the surface preparation session, papers were presented showing methods used at cleaning plants to increase the yield of commercial coal by reducing the loss from plant rejects. Methods for the economical recovery of fuel values from mine waste were also discussed. Emphasis was placed upon improving the quality of coal produced from washing plants through the use of laboratory tests to coordinate the mine operation with surface preparation. There was also discussion on the general principles of clarifying circulating wash water, and a description was given of methods used at one of the large surface preparation plants in the Pittsburgh area.

The mechanical loading session was most comprehensive in its coverage of this critical topic. Mining methods using shaker conveyors, power duckbills, and shortwaloaders were presented. There was also discussion as to whether mechanical loading with large or small crews gave the highest operating efficiencies. Two sessions were devoted to underground and gathering haulage and a face preparation session emphasized the use of new equipment designed for both track and trackless mining.

The strip mining sessions discussed progress and new developments needed for more effective operation. Stripping operations were reviewed in both anthracite and bituminous fields, giving drilling and shooting performances and comparative footages. Rotary drills were discussed with a description of types of drill bits, hole spacing, and recent improvements in explosives. The problem of stripping under increasing depths was also a critical topic, and finally the use of modified armor plate steel in the dippers of stripping shovels received attention.

Session Chairmen

The success and smoothness of the operating sessions were due to the efficiency with which the meetings were conducted. Distinguished mining men presided and with the cooperation of the Floor Committee the program functioned on scheduled time. Discussions were maintained in a well-ordered manner and all were impressed with the contribution made by these meetings to the practical aspects of mine operation. Those who generously gave their time to presiding at these sessions were Virgil C. Kibler, treasurer, Blackfoot Coal and Land Corp.; I. N. Bayless, president, Union Pacific Coal Co.; L. C. Campbell, vice president, Coal Division, Eastern Gas & Fuel Associates; Harrison Eiteljorg, general manager, Morgan Coal Co.; T. F. McCarthy, general manager, Coal Mining Dept., New York Central Railway Co.; J. L. Hamilton, district manager, Republic Steel Corp.; W. L. Burt, president, Greenland Coal Corp.; E. R. Cooper, general superintendent, Vesta Coal Co.; P. H. Haskell, vice president, Alabama By-Products Corp.; Thomas C. Cheasley, Sinclair Coal Co.; J. J. Foster, general manager, Island Creek Coal Co., and James Hyslop, vice president, Hanna Coal Co.

Meeting of Manufacturers Division

The Manufacturers Division of the American Mining Congress met on May 13, with Thomas McNally presiding. Secretary Conover reviewed in brief the work of the Manufacturers Division including details incident to the Convention and Exposition. Seven members whose terms expired were re-elected to the Board of Governors of the Manufacturers Division, these being: P. F. Bauer, Allis-Chal-

The meetings attracted a large attendance

mers Manufacturing Co.; H. H. Bullen, American Steel & Wire Co.; E. J. Burnell, Link-Belt Co.; J. H. Fulford, Jeffrey Manufacturing Co.; William E. Goodman, Goodman Manufacturing Co.; John T. Ryan, Mine Safety Appliances Co.; J. H. Sanford, Ohio Brass Co. In addition, C. S. Stainback, Westinghouse Electric Corp., was elected to fill a recent vacancy. The balance of the present board consists of H. V. Brown, Brown-Fayro Co.; J. J. Huether, General Electric Co.; O. H. Johnson, Mine & Smelter Supply Co.; Arthur S. Knoizen, Joy Manufacturing Co.; M. L. McCormack, Ingersoll-Rand Co.; Thomas McNally, McNally-Pittsburg Manufacturing Corp.; Frank E. Mueller, Roberts & Schaefer Co.; H. H. Pan-

The Manufacturers Division held its annual meeting

cake, American Car & Foundry Co.; R. H. Pearson, Gardner-Denver Co.; A. E. Pickard, Tamping Bag Co.; George E. Stringfellow, Thomas A. Edison, Inc.; Charles C. Whaley, Myers-Whaley Co., and R. E. Wiley, American Cyanamid Co.

At the board meeting of the Manufacturers Division the following were elected officers for the year 1948: Chairman, J. J. Huether; first vice chairman, J. H. Fulford; second vice chairman, M. L. McCormack, and third vice chairman, J. T. Ryan, Jr.

The Exposition

Four different levels of the Cleveland Convention Hall were filled with the displays of 189 companies exhibiting all varieties of equipment and supplies. Conveyors, coal cutters, transfer cars, locomotives, fans, mine cars, cleaning and preparation equipment, safety equipment, and replacement parts and supplies for the coal mining industry were all on display in booths which were attractive and exceptionally well planned. In many cases machinery was shown in operation and it was possible for the visitors to study the details of the mechanism under actual working conditions. To those who had not kept pace with equipment design and the development of new machines during the last five years, the improvements in mining and preparation machinery were truly astounding. It is interesting to note that much of the equipment on display at the exposition was shipped directly from Cleveland to various mines for immediate installation.

As a detailed description of these exhibits was carried in the April issue of MINING CONGRESS JOURNAL, exhibit descriptions will not be repeated.

Coal Division Meeting

The Coal Division meetings were open for discussion with the purpose of interesting additional operators and manufacturers in the work of this organization. Three sessions were held in all, the first starting on Tuesday morning, when reports were presented on track and conveyor haulage and various phases of underground power. The second meeting, which was held on the following day, reported on mechanical loading, pillar recovery, roof control, and full seam mining. On Thursday afternoon the Safety Committee discussed general problems of accident prevention with special reference to underground haulage and mine ventilation. These reports will be carried in future numbers of MINING CONGRESS JOURNAL and a detailed account of the Committee proceedings will appear in the July issue.

Entertainment

On Tuesday evening the visitors to the Convention were entertained at a "Coal Miners Party" in the main ballroom of the Hotel Statler. Cabaret entertainment and two floor shows followed the dinner. The program included an excellent male sextet, dancing, and a spectacular cyclist who enthralled the audience with his dexterity and amazing sense of balance.

The Annual Banquet, which was the biggest get-together of the entire week, took place at the Rainbow Room of the Hotel Carter on Thursday evening. The room was crowded to overflowing with over 1,100 people attending this climax of Convention activities.

With brief, pertinent, and humorous remarks, George H. Love, who presided as toastmaster, introduced those seated at the head table. He then called upon R. L. Ireland, Jr., who introduced Charles Augustus Otis, one

Interesting exhibits held the attention of "coal miners"

of Cleveland's best known after-dinner speakers who is frequently referred to as "Mr. Cleveland." Mr. Otis keynoted the occasion with a most delightful and humorous talk in which he welcomed the members of the coal industry to the city. "Charlie" Otis has achieved fame as a reconteur and his many stories kept the audience in a gale of laughter.

The speaker of the evening was Dr. Gus Dyer, former professor of economics at Vanderbilt University. After opening his remarks with several amusing anecdotes, Dr. Dyer said that the industrial progress of this country was largely the result of the constitutional protection of our fundamental rights. He urged that businessmen get out and fight for those rights and added that unless this is done, bureaucratic government might well constitute a threat to our industrial structure and our national well-being. At the conclusion of Dr. Dyer's talk, the banquet was enlivened by a well prepared and lively floor show, designed as a suitable closing to a most enjoyable evening.

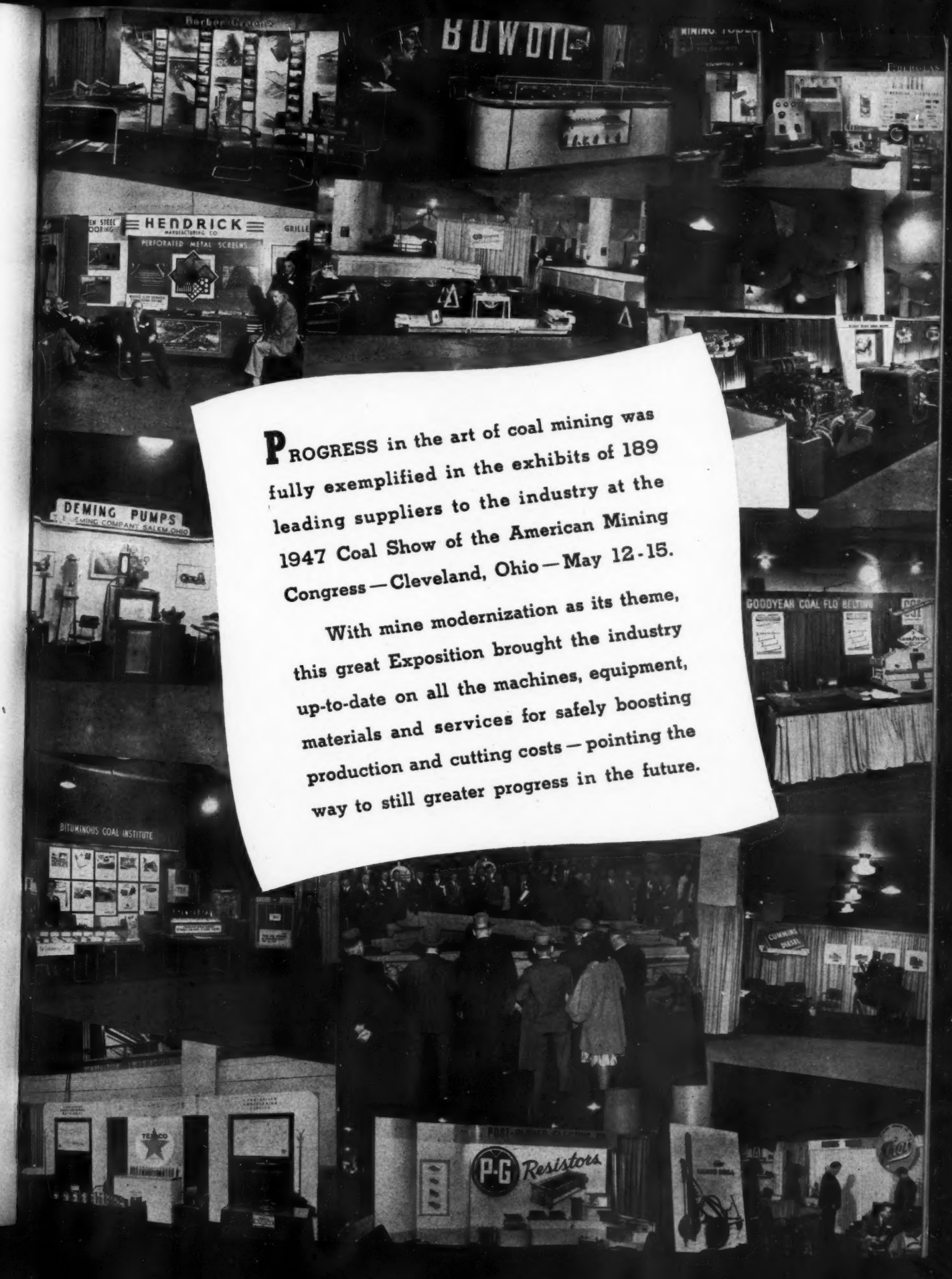
Ladies' Entertainment

For the ladies, the entertainment throughout the week was varied. On Monday a luncheon was served in the Lattice Room of the Hotel Statler. Tuesday a luncheon and style show were held at the Higbee Company attended by 175 ladies. It is understood that many, to the distress of their respective spouses, found this an excellent opportunity to purchase a summer wardrobe. On Wednesday a comprehensive tour was arranged through the east side of Cleveland and to the cultural gardens adjacent to the Museum of Art in Wade Park. These gardens, which are the work of the various foreign groups that live in Cleveland, are famous as representing the types of floral display common to many European countries but unusual in the United States. Buses then took the ladies to the home of Mrs. R. L. Ireland, Jr., where tea was served. The success of the ladies' program is due to the work of Mrs. Ireland and her committee members, Mrs. Frank L. Hornickel, Mrs. W. M. Osborne, Mrs. Whitney Warner, Jr., and Mrs. Julian D. Conover. Their untiring efforts contributed materially to the success of the Convention.

Plans for Future Conventions

It was decided at Cleveland that the two or three-day 1948 Coal Convention (without an exposition) would take place in Cincinnati beginning Monday, April 26. In 1949 Cleveland will again become the scene of the combined Convention and Exposition. The excellent facilities furnished by the huge auditorium assure the manufacturers adequate space for the display of large equipment. The city is centrally located in respect to the coal fields and if the outstanding success of the 1947 meeting is any indication of future events, 1949 should be a banner year.

The ladies program opened with a luncheon on Monday



PROGRESS in the art of coal mining was fully exemplified in the exhibits of 189 leading suppliers to the industry at the 1947 Coal Show of the American Mining Congress — Cleveland, Ohio — May 12-15.

With mine modernization as its theme, this great Exposition brought the industry up-to-date on all the machines, equipment, materials and services for safely boosting production and cutting costs — pointing the way to still greater progress in the future.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Digest of

CONVENTION PAPERS

PRESENTED herewith are brief abstracts from convention papers. The complete text, accompanied by diagrams and illustrations, will appear in the 1947 Coal Mine Modernization Year Book.

At the General Session on Monday morning, Charles J. Potter, Assistant to the President, Rochester and Pittsburgh Coal Co., discussed "Some Phases of Labor and Economics in the Coal Industry." The text of Mr. Potter's paper is presented in full starting on page 33 of this issue. The second paper "The Heat Pump for Comfort Heating and Cooling" by E. R. Ambrose, Air Conditioning Engineer, American Gas & Electric Service Corp., was published in the May issue of Mining Congress Journal.

A complete account of the Coal Division Committee Meetings will appear in July.

SURFACE PREPARATION

Recovery of Commercial Coal From Mine and Tipple Refuse

By **Alder F. Castanoli,**
Robinson & Robinson
Charleston, W. Va.

MODERN preparation plants are equipped to accurately and economically sort the good from the bad, even to the extent of making several type fuels. Mine rock, track cleanings, and surface refuse piles are often treated where formerly they were considered of no value. Other plants, particularly the older ones, are hard put to handle anything but a small amount of impurities, without excessive losses. This often hampers production and leads to the adoption of costly inside and surface methods. In some cases minor changes may effect economies far exceeding the cost. This paper deals with some of the problems encountered.

In the Winding Gulf Field in a Pocahontas No. 3 Seam mine, the usual impurities common to the field were found. With hand loading, selective mining was practical and the large bone band was in part gobbed inside. That portion reaching the surface was rejected at great expense. Mechanized loading made it desirable to mine the entire seam.

Studies showed that by breaking the bone band to minus 3-in. the coal portion would be free for washing. It was decided to crush all lump to 3-in. and wash it in an 8-ft. Menzie cone with the 3-in. x ½ in. which was already being washed in it. The Hydro separator was then used to rewash the 3-in. x ½-in. refuse from the cone; this product, with 20 per cent ash, was then dewatered and loaded separately into railroad cars for power plant fuel.

Approximately 200 tons of this fuel are obtained daily. Its realization is one-third to one-half that of good coal. While the real value of the installation is in rendering marketable a waste product, other benefits are the elimination of nine bone pickers and the lower cost of handling refuse.

The experience gained in the West Virginia operations has led to the employment of a similar, although more elaborate, circuit in Illinois. The entire output, reduced to 6-in. x 0, is washed through two No. 5 Norton jigs. The middling products from both jigs are crushed and rewashed through a smaller jig.

Another fuel recovery scheme of unusual application has been installed at Mine No. 3 of the Rail & River Coal Company. The coal at this operation is 100 per cent mechanically mined. It was planned at a future date to install a cleaning plant, but, pending this installation, a study was made of the amount of good coal in the hand-picked refuse, track cleanings, and in the mine cars of rock brought to the surface. It should be mentioned that the rock top at this mine frequently comes down on the coal shot down. This rock is loaded by machines, which accounts for some coal being included.

Tests indicated that virtually all the coal was in the 6-in. x 0 size and that in this range there were approximately 200 tons of good coal per day. Further tests revealed that best results would be obtained through crushing the 6-in. x 0 to 4-in. x 0, to free the bands. After the two stages outlined, a sizing and gravimetric study indicated that the plus 3-in. material was mainly composed of hard rock and could be discarded outright by screening without resorting to washing. The 10-mesh x 0, while not particularly high in ash content, was deemed a poor recovery possibility on both fly ash and high moisture objections. The 3-in. x 10-mesh fraction appeared to possess the desired washability features.

Based on these preliminary tests, a layout was made embodying the features outlined, and since its completion 100,000 tons of quality coal have been recovered from so-called mine refuse which formerly was wasted. The plant paid for itself in less than one year. An unexpected benefit derived through this installation has been the disappearance of gob fires, through lack of combustibles. This was formerly most serious since this mine is located in a well populated area.

Laboratory Control of Washing Plants

By **Jack M. Bishop,** Chemist
Truax-Traer Coal Company

THE importance of the laboratory varies over a wide range among the coal mining companies. Some companies consider it the heart of the organization, while others relegate it to a much lesser role. My company considers the laboratory a very essential part of the organization and insists upon very close cooperation between the laboratory, the chief chemist, the mine and the preparation plant. We use it as a guide to the operating department, particularly in regard to all problems of washing and preparation.

It is the purpose of the laboratory to keep a very close check on the performance of the plant so that if changes in conditions occur, the plant can be advised immediately, adjustment made, if necessary, with the result that the preparation plant is kept "on the beam." With this close check, we are able to detect and correct plant failures before damage is done or, in other words, before an inferior product is produced and shipped to our users. This control must also meet the changing conditions of the coal seam and operating conditions.

By running special checks and tests, the chief chemist will keep himself in a position to advise the engineers and operational staff on proposed changes or additions to the existing plant for future operations. Special problems arise which must be handled to meet the needs of some users of our coal and, last but not least in importance in the duties of our laboratory staff, is close cooperation with the sales department in providing customer acceptance of our product and also in checking and running down customer complaints when they arise.

The chemist, of course, can only report the results obtained from the samples before him, and if these samples are not carefully, methodically and properly taken, the results are of no practical value. There are several schools of thought on sampling, principally, with regard to how many samples to take during a day's run, and how the sample is taken, and whether the samples should be spot sampled or taken automatically.

Our procedure is to take spot samples at half-hour intervals during the running time of the preparation plant, accumulating half of each sample, and then making a proximate analysis of this daily aggregate sample. A quick ash and moisture is run promptly on each one-half hourly sample. The reason for taking half-hour sam-

ples is that we wish to know the limits above and below the "mean" that our plant is producing during the shift so that if adjustments are needed, they can be made quickly to insure a uniform resultant.

Too much emphasis cannot be placed on the actual sampling itself. Is it truly representative of the faction being analyzed? Only the person who takes the sample following a set procedure step by step can answer this question, and while there are many good ways of taking samples, we prefer the method of cutting the stream of coal at the discharge end of the boom or chute. Automatic samplers of various designs can be used, but any device which enables the man to cut the stream of coal and obtain the correct percentage of sizes (in blends) and obtain a large enough sample to be representative of that fraction is satisfactory.

After taking the sample, it is carried to the sample laboratory. There it is crushed in the ring grinder to approximately 20 mesh; riffled to about three pounds; pulverized, quartered, bottled, and labeled for the Analytical Laboratory. Since we consider it important to obtain the result from the sample as quickly as possible, we have devised a so-called silent messenger from our sample laboratory which is located on the 3rd level in the preparation plant to the Analytical Laboratory which is on ground level. We have a trolley wire connecting the two laboratories at an angle of approximately 45 degrees. On this wire runs a canvas bag holding one to four 2 oz. bottles; these are sent down the wire from the sample laboratory to the Analytical Laboratory by gravity.

The equipment in this laboratory consists of an analytical balance (sensitive to 1-20 milligram); quick ash furnace; volatile furnace; hot plate with three degrees of heat; calorimeter and the miscellaneous glassware, chemicals, etc.

It is our opinion that for plant control and most general purposes a proximate analysis is all that is needed and an ultimate analysis is not necessary. All tests are made in strict conformance to A. S. T. M. standards, but to check the accuracy of our chemist and equipment, once a month duplicate samples are prepared. A test and analysis of one of these samples is made in our own laboratory and the duplicate sent to Commercial Testing and Engineering Company for comparison. Some companies have a centrally located control laboratory where the several mine laboratory results are checked and enlarged upon if desired.

In selecting the control size for analysis, we select a size which represents a large proportion of our total output, and which usually is a difficult size to wash. In other words, a size which is representative of the wash box performance in the plant. This control size is usually one which is sold in the steam market or to industrial specifications. This control size, of course, varies at our different mines.

The samples of this control size are taken, as I mentioned before, at one-half hourly intervals throughout the run; they are prepared in the sample laboratory and reach our Analytical Laboratory in approximately 10 minutes. Immediately an ash and moisture check is run, and the results plotted on a daily graph sheet and the composite sample obtained at the end of the day's run is given an approximate analysis. This data is recorded on a special form we have prepared and is sent in to our main office daily.

Our chief chemist is expected to make periodic checks of the coal face, loading points, or in the case of a strip mine, the pits and method of loading. This brings about a closer cooperation between the actual mining of the coal and the laboratory, and in all of our mines excellent results are obtained. As an example, at one of our mines, the ¾-in. minus was coming to the plant extremely dirty. By cooperation between the superintendent, foremen, face bosses and miners the ash in this coal as received was reduced as much as 4 per cent. Specific problems come up at various mines, and it is the duty of the chief chemist at that mine to cooperate with the preparation plant as well as the operating department. Daily samples of refuse should be taken and checked either visually or preferably by sink-float tests. In addition to the regular procedure outlined above on the control size at a given mine, the chemist should take spot samples of other fractions for ash, moisture, and sulphur.

The Clarification of Washery Water in Closed Circuits

By S. M. Parmley, Asst. Chief Engr., Pittsburgh Coal Co., Library, Pa.

IN the design of a washery and its inherent water circulating system, it is impossible to generalize and to cite empirical formulae which may be applied to any or all plants. Every cleaning plant has its own limitations, characteristics, and peculiarities as to capacities, end results, apparatus, treatment and flow sheet. However, it is factual that with an increase in the quantity of the circulating water, there is a tendency for:

1. An increase in the size consist of the solids in the returned circulating water.
2. An increase in the density or per cent solids in the returned circulating water system.

The results of increasing the density and viscosity of the polluted circulating water results in:

1. That a higher density and viscosity will float larger and heavier particles, thus still further increasing the density and completing the vicious circle.
2. The more material maintained in suspension the smaller the quantity of additional precipitate available during operation for recovery and treatment.
3. The reaction of increasing the water density is that the additional solids maintained in suspension are in most cases of low ash content, and as they are present in the water system, they are missing in the precipitated sludge, with a consequent increase in the ash content of the sludge.

Whatever the type of washery, irrespective of its capacity, the raw coal size, its characteristics or the actual process employed, there is one basic fact, that as soon as raw coal and its associated impurities are immersed in water, even under quiet conditions, the water becomes polluted by liberation of the sludge forming particles. It is a controversial question as to the density or per cent solids allowable in the washery circulating water circuit for satisfactory and consistent operation of the coal-cleaning circuit. It is generally conceded that some method should be adopted to at least partially control the density of the circulating water. The quantity of such solids liberated in a commercial plant varies within wide limits and is dependent primarily on grading of the raw coal and the characteristics of the shales and clays in the coal, also, on the process and equipment employed in the washery plant.

Having thus liberated in an actual installation a quantity of sludge forming and water polluting solids, usually at the rate of several tons per hour, the problem arises to precipitate or settle out and withdraw them from the water system in order to obtain a balanced condition and thus maintain the clarity and consistency of the washery circulating water. Having done this, the next step is to recover the slurry and deliver it continuously to a dewatering apparatus, in order to produce a product that can be readily transported, utilized, or pumped to waste disposal in a liquid form.

It has been more or less customary in the past to make provision for settling the water in a conical tank, a series of sumps, tanks or spitzkastens, wherein the velocity of the washery water is checked and reduced, so that the solids will settle. Such cones, tanks or basins really act as hydraulic classifiers, that is, the velocity of flow is reduced to such a point that particles above a particular size are settled by gravity against the flow.

It therefore follows that the water velocity is an important factor in plants of this type. The design of clarification system should provide that:

1. Suitable settling basins be provided of ample area and proportions.
2. Total area (not volume) of the cone or basin be efficiently utilized.
3. The clarified water is of a satisfactory density and viscosity for recirculation.
4. That eddy currents be eliminated or reduced.
5. Provisions be made for handling the quantities and grades of one or more types of sludge produced.

The methods which are commonly employed to reduce the accumulation of solids in the washery circulating water are as follows:

1. Running a part of the washery water to waste.
2. Prescreening to remove particles before the coal comes in contact with the water.
3. Pneumatic dedusting before washing to remove the fine particles.
4. Tapping off a portion of the circulating water and removing the solids by settling, chemical treatment or by filtration.

Mr. Parmley then described, in detail, the clarification system at their Champion Cleaning Plant, concluding as follows:

1. Strip-mined coal produces a greater quantity of sludge solids and causes a greater quantity of slimes and high-ash impurities in the minus 200 mesh particles, which produces a colloidal slime, very difficult to settle.
2. Mechanical-loaded full seam-mined coal produces a greater quantity of solids and high-ash minus 200 mesh slimes than mechanically-loaded face-prepared coal or hand-loaded coal.

The writer has tried to show by the foregoing in a brief manner that while sludge is and always will be an inherent feature of coal-washing plants, no matter what their capacity or type, and irrespective of the size and characteristics of the raw feed, the quantity of sludge and water pollution solids may be reduced but not entirely eliminated; that consideration should be given to the economics and advantages which may be derived by cleaning the sludge.

Careful consideration should be given to the dimensions, the type of the water clarification system, sludge recovery, and the dewatering units, in an endeavor to install and operate units with a reasonable capital expenditure and operating costs. But what is the most important point from an economic point of view is the overall efficiency.

All the above points should receive detailed consideration according to the seriousness of the problem. It should be realized that the first cost is not the only cost, and that it is more expensive to rectify a trouble than to prevent it. Efford should be made in the design of the washing plant to, not only obtain a maximum economic yield of recoverable coal, but, also stabilize the internal conditions and results of the washery system, prevent the pollution of the streams, and prevent the loss of saleable coal.

SAFETY

Safety Progress in Coal Mining

By C. G. Brehm
Supervisor of Safety and Compensation, Susquehanna Collieries Co.

THE progress in coal mine safety is shown by graph in Figure No. 1. This chart illustrates the definite downward trend of the fatality rate in the coal-mining industry.

The mechanization of mines has contributed greatly, both to production and to accident reduction in mines. The amount of coal mined and loaded by hand has decreased over 50 per cent in the last decade. However, while mechanical mining may have contributed to the reduction of such accidents as falls of roof, haulage and explosives, it has probably contributed to accident occurrence from fires and explosions by adding new hazards. During the past decade, the percentage of strip mined coal has greatly increased and this has a profound effect on the statistics covering accident reduction of the coal-producing industry as a whole.

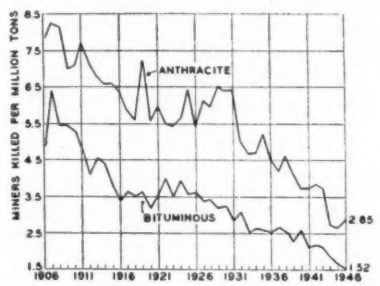


FIGURE 1

Falls of roof and coal are and have been the major causes of mine accidents and constitute approximately 50 per cent of the total of fatal accidents. Slow, but definite, progress has been made in the reduction of these types of accidents and the trend of the past few years has been downward, although it now appears from tentative figures that the fatal accident rate from falls of roof and coal may be slightly higher in 1946 than in 1945.

Fatalities and injuries from gas and coal dust explosions show some lessening in the past few years but there is a material lowering from the rates of 20 to 30 years ago. More publicity is given to this cause of mine fatalities than any other, due to its multiple loss of life and, a major disaster occurring from time to time, almost always arouses public opinion to demand that something be done about it. However, definite progress has been made in reducing major disasters and, while they do occur and may continue to do so, nevertheless, both frequency and severity of major disasters have shown a marked reduction.

Perhaps we, in the past, have considered safety too much of a specialty, something extra to be added or something for someone else to attend to. To be effective, safety must be a definite part of the job. Hanging a "Safety First" sign on a piece of machinery will never take the place of proper guarding. Simply telling an employe to be careful has little value unless he knows how to be careful. So in conclusion, it is suggested that any effective safety program must include not only the removal of physical hazards but must also include the education of our workmen, remembering that no job is efficiently done unless it is safely done.

Mine Fires—Their Prevention and Control

By E. F. Maurer, Genl. Supt., Rail & River Coal Company

MINING organizations everywhere are deeply concerned with the occurrence of mine fires; although the greater number of these are of a small nature and readily extinguished, they nevertheless indicate that greater precautions must be taken. All fires, in their incipient stages, are readily extinguishable. However, all responsible officials know the disastrous possibilities of a small fire getting out of control through various causes, such as improper procedure, late discovery or lack of essential facilities. If proper safeguards have been taken, the possibilities of such happenings will be minimized. Since the prevention of fire is preferable to control, a vigorous program for elimination of fire hazards should be strongly enforced.

It is entirely possible to adopt precautionary measures for fire prevention without imposing financial burdens or appreciably increasing operating costs. An effective program would include: Removal of combustible material from possible contact with energized power lines; installation and maintenance of electrical equipment in such manner that electrical ignition hazards will not result; systematic inspection of wiring and bonding; sectionalizing of power circuits, dust control and use of flame-proof insulation.

Installation of cut-out switches on all power lines at definite intervals, suitably marked so that power lines can be de-energized in a minimum amount of time in case of emergencies due to wrecks or roof falls, are a positive requirement for fire prevention.

The use of single conductor power cables wherever they can be used advantageously, as for example in duckbill mining, with the excess cable kept coiled on framework, so that air will freely circulate, reduces the possibilities of cable fires. Rock dust, stored at all points where secondary service in the working areas is taken off a primary conductor, is a cheap and efficient preventative measure for control of cable fires. Correct fusing of cables so that their rated carrying capacities will not be exceeded, and proper splicing are good operating rules as well as preventative measures for fires.

In spite of all preventative measures taken, mine fires will occur and facilities for their control must be provided. Extinguishing equipment, using a variety of chemicals suitable for first-aid fire protection, is readily available and the type selected is usually a matter of personal preference. In general, two types of extinguishers will suffice to cover all classes of underground fires. One type should be that which uses a non-conducting extinguishing liquid. This can be of small capacity but have wide distribution throughout the mine and should be installed in sufficient quantities wherever electrical fires are apt to occur. This type is also suitable for controlling fire hazards originating through the use of flammable material such as oil and grease. All switchboards, loading and cutting machines and motors should be provided for this type extinguisher. The other type extinguisher is of large capacity and mounted on mine car trucks. This will handle the ordinary mine fire as well as oil and grease fires and is a most valuable asset when used in conjunction with a high-pressure water distribution system.

Our mine in the No. 8 seam presents unusual fire hazards, both from the standpoint of prevention and control. Mine developments are extensive and haulageways five miles in length, timbered and lagged throughout their length, present a fire hazard that is ever present and necessitates a wide range for effective control of fires. This problem was effectively solved by the installation of water lines throughout the mine. Water is distributed through an elaborate pipe-line system that parallels the haulage ways and consists of a 3-in. main line, and 2-in. and 1¼-in. lines on the working sections. Pressure is maintained by having two 10,000-gallon tanks which furnish sufficient pressure for ordinary mining needs and two centrifugal pumps that can readily be placed in service, should the need of high velocity water supply become necessary to combat mine fires. Openings at 1,000-foot intervals in the water lines, equipped with connections to accommodate standard 2½-in. fire hose, are assurance that fires on the haulage way can be quickly controlled.

Two fire-fighting stations at strategic locations, one of which is close to intake air shaft, are fully equipped with all materials and facilities needed to combat fires by the use of a high-pressure water system. This equipment is further supplemented by two high-pressure, large-capacity, mounted chemical extinguishers and a portable centrifugal pump to insure high-velocity water pressure where needed. Several dams of 20,000-gallon capacity have been constructed and are integrated with the main water distributing lines. Each dam is equipped with a pump of sufficient capacity to take care of any temporary failure of the outside water supply. A wide distribution of portable extinguishers on all working sections, and rock dust stored at intervals along the haulage ways, doors and turnouts, help complete the facilities provided for effective fire control of the hazards existing in our mine.

The installation of the *best* fire-fighting devices and equipment is of no great value unless capable and efficient men are trained in their use. The men selected for this all-important task should be men who are engaged in transportation, as this class of employe are usually energetic, capable of being trained and familiar with the general details of the mining operations.

Much can be said of correct procedure for combating fires, but several cardinal points must always be observed: First, prompt withdrawal of all employes from the mine, especially those who are immediately endangered by smoke and asphyxiating gases. Second, combating the fire with all the facilities at hand. A predetermined course of action will save many precious minutes in the early stages of a fire; such a plan usually results in fires being brought under control. Each foreman should be fully acquainted with all details in reference to alarm signals, such as removal of power for a stated number of times, or by telephone whenever possible, and then proceed to remove all his men to safety as rapidly as possible.

Man Trips Underground

By P. M. Cassidy, Safety Inspector, Sloss-Sheffield Steel & Iron Co.

WITH the advent of portal-to-portal work time in the coal industry, it became a problem of major importance to transport men to and from their working places quickly and safely. Less time spent in handling men will give more work time at the face and an increased production per shift. The ideal arrangement, and one that a number of operators have attained, is to have the men load into man-trip cars on the surface and transport them directly to their working places, without delay, without transferring from one trip to another, and with a minimum amount of walking.

This discussion will deal with the procedures and equipment used by some operators in reaching this ideal arrangement, or in approaching it as closely as natural conditions and other considerations permit. It will not discuss all procedures and equipment used or applicable to every condition, but will attempt to outline some general, safe methods in use, and to describe some of the equipment.

At this point Mr. Cassidy presented a detailed outline of methods employed in shaft and slope mine trips, main line man trips, and belt transportation. Safety equipment, signal methods, and special steel cars were also discussed.

Various rules of conduct are required of the men on mantrips by different companies, as experience, and conditions, and the mine law determine. Some companies require all men to wear goggles while riding the man trip cars; most of them control the loading and unloading closely, to prevent pushing, and running, and over-crowding in the cars; men must not sit on the wire side of the car. Smoking on the man trip may be prohibited in an open-light mine. Men may be required to remain seated when the man trip stops at its destination, being permitted to unload when a whistle blows, or at some other signal from the supervisor in charge of the trip. In several cases the supervisor moves along beside the trip after it stopped, permitting the men in each car to unload only after the men in the previous car had unloaded and were walking off. Men must get off the cars on the clear side only, even though the trolley wire and feeder lines are guarded.

Man-trip accidents, or injuries resulting therefrom, do not occur frequently. The results of such an accident could be so serious that, in most cases, reasonably safe procedures and equipment are used, sometimes exceeding the care that may be required by the State mine laws or by insurance company specifications.

Mr. Cassidy then summarized the important factors to be observed in the operation of man trips under seven headings as follows:

(1) Type and condition of equipment
(2) Inspection and maintenance of man trip haulageways
(3) Waiting places
(4) Discipline in loading and unloading
(5) Number of persons per car
(6) Care by motor crew
(7) Speed

MECHANICAL LOADING

Mining Methods With Power Duckbills

By John Pschirrer, Vice Pres., Pschirrer & Sons Coal Company

OUR mine is located in Fulton County, Illinois, about 200 miles south and west of Chicago. We are in the Illinois Number Five Seam, 48 in. thick, fair top and rather soft fire-clay bottom. The coal is of a woody texture, the impurities consist of bottom boulders, some sulphur and horsebacks. We are primarily a truck mine with the added advantage of being located on a railroad so that some of our tonnage is loaded in cars.

In 1942 our first shaking conveyor equipped with an automatic type duckbill was installed. The room and pillar system was used, turning rooms on 40-foot centers and driving them 30 ft. wide. with 10-foot pillars to a depth of 375 feet. We adopted the three entry system driven in 40-foot centers with 28-foot pillars, cross cuts and necks 12 foot wide. This enables us to set up in a new room and start out without any hand loading; the conveyor belt being in the center entry, the same is accomplished on either side.

Coal is undercut with hydraulic controlled shortwall machines with 8½-ft. cutter bars and equipped with automatic bugdusters, making the average 7½ ft. undercut. The average tons per fall is about 33 tons. Four men are used in rooms and three in entries: One cutting machine operator, one duckbill operator, one drill man, and one timber man who spends about half time timbering, the rest of his time at the face assisting the duckbill operator after the drill man begins to drill. This crew of men averaging 2½ falls per day, or a total tonnage of approximately 82.5 tons per 7-hour shift, drives a room to its full depth in 17 shifts.

All duckbills load on to a conveyor belt 30 in. wide, 1,500 foot long in tandem with a 310-foot chain conveyor feeding on end of belt making panel entries 1,810 foot in length for a total of 72 rooms producing approximately 135,000 tons of coal. Track is used on main line only. Since the advent of the duckbills, no grading is done by hand, the rock is loaded by the duckbill on to the belt or directly into cars.

In 1946 we installed our first power duckbill and owing to the vast improvement over the older type, the tonnage per man immediately went up and labor costs went down. The big improvements are the ability to move by power laterally across the face, driving room 45 to 50 ft. wide and its high loading capacity.

The cycle of operation was somewhat changed in that three buster shots instead of one were used, one directly in front of each drill set up. These are fired with one stick of permissible each, and all shots are fired simultaneously. After blasting, the fly coal is cleaned up before the pan line is extended, thus virtually eliminating all hand shoveling.

When the power duckbill was installed, room centers were increased from 40 to 50 ft., thus enabling us to drive 45-ft. rooms. With the same number of face men, we have been able to get three falls per day averaging 45 tons per fall or a total of 135 tons per day, an average of 33¾ tons per face man. This completes a room in 14 shifts of seven hours each. The average moving time is about seven hours or one hour longer than with the old type; this extra time being for the time consumed in maneuvering the longer duckbill and connecting it up. In the future, entry development will be on 45-ft. centers to allow for the additional length.

We found that due to the higher loading capacity of the new type it was necessary to change the cycle of operation to some extent, principally to give the drill man more time. We now load through the fall directly in the center and as the loading operation advances to the right, the drill man makes his first or middle set-up while the operator is loading out the right side of the place. While this is going on, the machine runner is setting bits and getting ready for the next cut. As soon as the right side is loaded out, the shortwall moves in and starts to cut. By the time he has sumped and moved away from the corner, the drill man has finished his center set-up and is now ready to move to the right side for his second set-up.

After the dust is loaded out to where the shortwall has cut, the duckbill operator proceeds to finish loading out the rest of the fall of coal, while the cutting machine is following the loading as it proceeds across the face. By the time he has finished his cut the driller is ready to make his third and last set in the left corner. We have found that this cycle of operation has practically eliminated all dead spots, so at no time are there two men doing a job that one alone can do.

Mining Methods With Shortwaloaders

By C. E. Hough, Genl. Supt., American Rolling Mills Company

THE Shortwaloader is a combination cutting-loading machine which undercuts and loads simultaneously, thus approaching the ideal for a continuous loading unit. The principal parts of this cutter-loader consist of three bars on the front of the machine for the cutting - loading operation, a gathering conveyor and discharge conveyor. The bottom, or cutting bar is 10 ft. long and extends 5 ft.

beyond the end of the bottom loading bar, which is located just above and 20 in. to the left of the cutter bar. The top loading bar is seven in. shorter than the bottom loading bar and located directly over the bottom bar. With this arrangement the depth of each cut is 4 ft. 6 in., which means an average advance of 4½ ft. with each cutting-loading cycle.

Control and movement is identical to that of a conventional shortwall cutter. It has a cutting chain speed of 420 ft. per minute and loading chain speed of 375 ft. per minute. Movement of the machine across the face is by means of friction driven rope drums, which have a slow feed speed of 19.6 in. per minute for cutting and loading and a fast feed of 15.5 ft. per minute for handling or moving. The variation of the drum speeds is obtained by changing the gear ratio of the rope drum drive, which is manually operated. Two hydraulic jacks, controlled by a hand-operated pump, are located on each side of the machine in order to provide for the vertical adjustment required for cutting a smooth bottom. The rear conveyor is attached to the dolly truck, located on the room conveyor at all times during normal loading operations.

The application of the Shortwaloader has certain limitations, such as seam height, top and bottom characteristics, bands of impurities, or draw slate, and size consist of the product. This machine has operated successfully in seams from 34 in. to 60 in. in thickness and it is questionable if satisfactory results can be obtained in seams beyond this range. While a soft, or weak bottom, will affect the operation and efficiency of the equipment in the same manner as a Shortwall cutting machine, it has been operated to a reasonable degree of success on what would normally be considered a weak bottom. Where soft bottom is encountered, the shoe of the hydraulic leveling jacks should be larger in square area and turned up on all sides.

One of the most frequent questions asked by operating men, is: "Will it work in bad top?" This, of course, requires that some understanding must be reached as to what and when is the top, or roof, considered to be bad. Since the question of bad roof is a very extensive and complicated subject in itself, no attempt shall be made here to qualify bad roof to the extent that it will permit reaching a specific decision on the application. Since mechanical loading equipment was first introduced, the roof characteristics, under which the equipment is operated, has been one of the principal controlling factors on the results obtained. As equipment has been improved and loading capacity increased the problem of roof control has demanded more and more attention. The higher the degree of mechanization and efficiency of the particular equipment in use, it is found that the greater is the effect of the roof conditions on results obtained.

The operation of this machine under varying degrees of unfavorable roof presents about the same problems consistent with other type loaders and the efficiency will be in the same proportion. It can be stated definitely that the machine cannot be operated successfully under conditions where the roof is not sufficiently firm to hold the feed rope jacks. Likewise, the equipment would be operating under a severe handicap in narrow work requiring close timbering.

The ability of the Shortwaloader to handle slate, or bands of impurities, is limited only to the size of the material that the discharge conveyors will pass, which is approximately 12 inches. Otherwise the difficulties are not different from those present in other mechanical loaders. While the design will permit loading lumps up to 12 in., it is doubtful if maximum capacity can be obtained under conditions where special effort is made to obtain high percentages of prepared sizes in the plus three-in. product. Screen analyses have shown the size consist of the minus three-in. product is comparable to that produced by other types of loaders. Considerable variation in production can be expected if it is necessary to obtain high percentages in the larger sizes at a sacrifice in loadability. Two of these machines in 19 days of double shift operation, working under favorable top and bottom conditions in two entries 20 ft. wide, made a total advance of slightly over 1,000 ft. each, including cross cuts and room necks. Crews consisted of four face men, who delivered all supplies to the face on the regular shift and the average advance per face shift was 29.5 ft.

Mechanical Loading With Large Crews and High Tonnages

By G. N. McLellan, Supt.,
Weirton Coal Company

ONE of the most important questions to be faced by management when considering mechanization of a coal mine is whether to operate with large section crews and high capacity units to obtain high tonnage, or to operate with small crews and accept correspondingly smaller tonnages. It is realized that this subject is highly controversial, and that arguments can be produced that can be substantiated for both sides of this question. The discussion presented herewith is based largely upon the experience of mines operating in the Pittsburgh Seam in Southwestern Pennsylvania and Northern West Virginia, and more particularly upon experience at the Isabella Mine of the Weirton Coal Company at Isabella, Pa. While equipment in use at this mine is all track-mounted, the same arguments advanced herein regarding high-capacity track-mounted equipment will apply equally as well to similar equipment on rubber tires, or caterpillar-mounted.

In a mechanical loading section it is of great importance to maintain a sufficient number of working places so that a continuous operation of all jobs can be in progress without causing a delay or stoppage of the loading unit. In order to maintain a uniform tonnage from both development and pillaring work it is felt necessary to operate 12 to 14 working places on development, while on pillar sections 18 to 20 places are required. This number is necessary for a large tonnage unit in order to provide working places for loading, cutting, drilling, shooting—with several places shot down ahead of the loader; places being timbered; places being tracked; on pillar sections, two or three places driven through and ready for falls; places out of service because of rolls, water, or bad conditions in general; and finally places for a standard leave for the oncoming shift.

The organization of a crew for mobile loading where high tonnages are expected must be given thorough planning. In most mines the crews vary due to the physical conditions that exist. At Isabella the conditions throughout the mine remain fairly uniform which permits adherence to a standard crew of 16 men for all loading units.

Where there are not sufficient men on a crew and not a sufficient number of working places to provide adequate preparation ahead for the continuous operation of the loading machine, a loss in production must be expected. When the initial investment in mechanical equipment for just one loading section is considered, and taking into consideration track, brattices, pumps, trolley wire, and all the other necessary items to operate a section, it appears that the whole problem of large crews and high tonnages becomes largely a matter of economics. Much importance is given by most operating men to the tonnage produced per man on the payroll, but the thing that REALLY pays off is the tons per dollar invested in the mine as a whole. Therefore, to justify the investment, we must get the coal; and, to get the coal, we must operate all equipment to full capacity.

The term "full capacity" must of necessity depend on the part of the working shift during which the loading machine can be kept at the working face. Any loading machine on the market today has a potential loading capacity far greater than the shift tonnage that most mines will show. It is hoped that someone will some day devise a system of mining, and develop such equipment that will enable coal loading to be done with nothing else required during a full operating shift. This would be the ideal condition, but so far it has not been attained.

Granted that the loader spends a minimum of time in a cut, it must, when that place is cleaned up, have another place ready to load. The time it must spend in tramming cannot be avoided, and there are certain unavoidable delays which will take up a part of the working shift in spite of everything that can be done to prevent them. But, there is no reason whatever why a loader should finish cleaning up a place and then wait for preparation. The next place must be ready to load so that the loading machine can go directly to it, and the next place, by all means, should be in the working cycle of that particular section. Time spent in tramming from one end of the section to the other to load out two widely separated cuts can only be classed as a delay and certainly an avoidable one.

From this it can be seen that what is meant by operating at full capacity is keeping the loader in coal for as large a part of the shift as is possible, and the only way in which it can be done is by keeping places prepared ahead of the loader, and this can only be done by a large crew working ahead. I say "large crew" but actually the crew should be the smallest crew possible that can get the necessary work done. What is required for normal seam conditions is the right number of men to keep preparation ahead of the loader and have enough in reserve for the standard leave for the next shift. This excess capacity is necessary to assure full working time for the loader, since coal over the boom of the loader is what finally pays off.

This is a day of specialists, and in the fast-moving cycle of a mechanized mine, a man who has one job to do and stays on that job will do better than if he goes from one occupation to another during any one work day.

The loading crew, comprised of the men on the loading machine and gathering equipment, is the "spark plug" of the entire section. They are the ones who set the pace and give the other men on the crew the "push." The roadman and the timberman know that they must have places tracked and timbered so that there will be no delay to the drilling and cutting operations. Likewise, the cutting machine crews and the drillers know that they have

"to step out" in order that the shot-firer may have places shot down in advance of the loading machine so as not to cause a delay in the loading operation.

To get high tonnages with large crews, pride and initiative must be developed in *all members*. Large crews afford this opportunity as we can create more incentive among the men to do more and better work, for it is these men whom the foremen advance from time to time to the more skilled and higher paid jobs. Likewise, the operator of a loading or cutting machine is certain to take care of his job because he knows that if he does not produce the tonnage, there is always some one waiting to take his place. A better competitive spirit can be developed among the members of a large crew than is possible in a small crew.

The only effective way to obtain maximum benefits from large crews and high-capacity units is to operate all equipment at its maximum capacity as near 100 per cent of the available time as possible. Careful planning of all phases of the mining system and close supervision at all times is necessary to accomplish this goal.

Mobile Mechanical Loading Using Small Crews

By **Joe F. Mazza, Mgr. of Maintenance, Rochester & Pittsburgh Coal Co.**

THE coal industry must aim at 50 tons per face man under average mining conditions in order to meet the competition from other fuels and management must do this job by close cooperation with labor and through an efficient mechanization program. In my opinion, this production can best be reached through the use of small crews with, of course, adequate service, such as prompt delivering of supplies to the face, placing sufficient empties at the loading point, continual inspection of equipment and preventive maintenance to keep delays to the lowest possible minimum.

It is readily apparent that with small crews it is much easier to train each man to be more versatile. This versatility gives more efficient and much safer crews which is most essential in coal mining. In the event of power or equipment delays, absenteeism, and bad physical conditions in the mine, small crews can maintain a more constant tonnage with lower costs. Also, with small crews, we can eliminate one thing that I think is wrong with mechanical mining—we are over-manned with bosses. This means high overhead costs and should be watched closely when future tonnages become more normal.

To bring out some of the advantages of small crews for mobile loading, I will use as an example a mine working seam, averaging 48 in. high, using room and pillar system. In this mine we have two developing flat entries, three developing butt entries, and three double production butts, all working two shifts per day.

In each flat we drive six entries, using one cutting machine, one loading machine and two shuttle cars. The coal is hauled from the face by the shuttle cars and is discharged directly into 10-ton mine cars. We use a cutting machine operator and helper, a loading machine operator and helper, two shuttle car drivers, one shot firer, and one utility man. Also, one mechanic and one assistant foreman who divide their time between a flat entry and a nearby developing butt. Bottom rock is taken in two of the entries, using a Sullivan rock loader with a three-man crew who drill, shoot and load the rock direct into the mine cars. Working these two flats two shifts per day we produce 672 tons, using 12½ men per shift in each flat, or a total of 50 face men per day, averaging 13.4 tons per man.

In each of the three developing butts we use one cutting machine, one loading machine and one cable reel shuttle car. The coal is unloaded directly from the shuttle car onto a Jeffrey 30-in. belt conveyor which is located in the center heading and travels to the loading point where the coal is discharged into the mine cars.

Each crew has a cutting machine operator and helper, a shot firer, a utility man, a loading machine operator and helper, a shuttle car driver and a boom man. Also, a belt cleaner, a mechanic and an assistant foreman divide their time between two butts. Working two shifts per day the three entries produce 857 tons, using 9½ men per shift in each butt, or a total of 57 face men, averaging 15 tons per man.

In each of the three double production butts we use a 30-in. belt conveyor in the center heading and on each side we drive three rooms as a unit, using one cutting machine, one loading machine and one cable reel shuttle car which moves from the face to the room neck. The boom-man at this point takes care of the push button switches which start and stop the belt, moves the cars, and the only additional work he has is to swing the gate in the pantleg chute from the loaded car to the empty.

In this set-up we have two cutting machine operators and helpers, two shot firers, two loading machine operators and helpers, two shuttle car drivers, one mechanic, two utility men, one boom-man and one assistant foreman. Also, we have a belt cleaner who cleans the belts in a double production butt and a developing butt and his time is divided between them. This gives 17½ men in each double production butt per shift, or a total of 105 men each day in the three double production butts, producing 3,024 tons per day, or an average of 28.8 tons per man.

The sections as described above use a total of 212 men. In addition, we include the following face men: eight supply men, one supply motorman, one supply brakeman, four fire bosses, nine moving men. This gives us a total of 235 face men producing 4,551 tons of row coal per day.

UNDERGROUND HAULAGE

Economic Limit of Shafts and Slopes

By **C. C. Conway, Elec. Engr., The Consolidation Coal Company**

THE choice between shafts and slopes has always been based upon two considerations: *First*, the cost and convenience of utilization, and *second*, the cost of sinking and equipping. The order of importance of these two considerations is logically as they are presented. For instance, an opening to be used for the sole purpose of ventilation, may be either a slope or shaft, as far as convenience and cost of moving the air is concerned, and the choice in that event would be based upon the relative costs of the two types of openings. Now suppose that it is thought advisable to make the opening suitable for an emergency escape-way for men. The slope then has definite advantages in that no auxiliary equipment is required except steps and hand rails in the event that the slope is steep.

Comparing the cost of sinking the two types of openings, it might be found that the shaft could be sunk at somewhat lower cost than the slopes, but the elimination of hoist equipment and attendants for years to come would probably offset the cost differential. It is well to keep in mind that slopes are almost always, regardless of their prime use, suitable for escapeways.

In the case of openings, primarily for the purpose of hoisting coal, there are many considerations and limitations, but it is quite obvious that where there are distinct advantages favoring either the shaft or the slope, in the handling of the product, that the cost of sinking by the two methods should be of secondary consideration. The additional cost of sinking the preferred opening may easily be amortized in the utilization. For example, the saving of only three shifts of labor per hoisting shift of a 3,000-ton mine would net a saving of approximately $.01 per ton hoisted and through the life of the mine might total several hundred thousand dollars, depending upon the total tonnage to be handled through the opening.

The individual advantages of shafts and slopes for hoisting openings cannot be considered without taking into consideration that different type hoists are indicated. The slope is not particularly advantageous in hoisting, unless a belt conveyor is desired, but the advantages of the belt conveyor are so many that the selection between the slope and shaft narrows to a question of whether or not the belt can be justified economically. The advantages of an even flow of coal into the preparation plant, reduced man power requirements in moving coal from the underground bin to the surface, and high efficiency hoisting with low kilowatt-hour-consumption per ton hoisted are all so desirable that the designer cannot fail to include the belt conveyor hoist, and consequently the slope, in his plans, unless some unusual local conditions prevent its economical use.

Until the last very few years, the belt conveyor had one serious disadvantage in that the maximum lift, on the average 15 to 18-degree slope, was about 250 ft. and where the vertical depth was greater than the figures mentioned, it was necessary to provide an additional belt or belts to obtain the necessary lift.

Recent developments in belt construction have extended the possibilities of belt conveyors, permitting installations of longer centers, higher lifts and greater loads. The greater strength has been ac-

complished by one belt manufacturer by the replacement of ordinary cotton duck with steel cables placed in the longitudinal direction. This manufacturer, using the steel cabled belt, states that they are in a position to supply conveyor belt suitable for better than 1,500-ft. total lift. Another manufacturer, using more or less standard construction methods, but incorporating newly developed fabrics, has increased the maximum permissible tension to 150 lbs. per inch per ply from the usually accepted 60 lb. for 48-oz. duck, which at present is the strongest duck available. The construction with the special fabric is such that the number of plies for a belt of a given width can be greater, than when using the conventional duck, for the same troughability. The net result is that in the case of a 36-in. belt, the over-all permissible working tension has been increased from 12,960 lb. to 48,600 lb., thereby extending the possible total lift 3¾ times to a figure of approximately 1,000 ft. These improvements in the strength of conveyor belts have extended the most serious limitation of belt conveyor hoists. Very few coal mines in this country will present hoisting depths beyond the range of these new belts.

There has been no outstanding improvement in the methods of shaft sinking within recent years. There has been improvement in the tools of shaft sinking, including the explosives, but the excavated material is still loaded by hand into buckets and hoisted over the workers to the surface. There is one exception: in special cases, where the area under the shaft has been previously worked and is still accessible, it is possible to use the "hole stripping" method wherein a large pilot hole, usually 12 in. to 18 in. in diameter, is drilled through to the opening below and then enlarged to the desired dimensioned shaft.

The driving of a slope on the other hand is a highly mechanized proposition. There is no hand loading or mucking in the driving of a slope for belt haulage purposes as the mobile type loading machine on caterpillars easily negotiates on grades suitable for belt haulage. Therein lies the reason that a slope can be driven through shales, limestones, sandstones, etc., at a cost competitive with shaft costs even though the slope distance may be 3 to 4 ft. for each foot of vertical depth. It must be recognized, however, that the slope, under its most favorable conditions, has difficulty in competing in cost with shafts sunk by enlarging a pilot hole. In this last case the hand mucking is largely eliminated by dropping the excavated material through the hole to the underground workings where the material may be machine loaded and gobbed underground. The advantage in either case is that the operation is mechanized.

Supply Haulage in Trackless Mining

By **Robert Fletcher,** Consulting Engr.,
J. H. Fletcher & Co.

SUPPLY haulage is the problem of transporting material into and about the mine, and distributing it with a minimum of interference with the flow of the coal. Where trackless gathering is employed, i.e., shaking conveyor, chain conveyor, or rubber-tired unit discharging directly into mainline mine cars, there is usually a rehandle of material between the mine car and the gathering equipment. Frequently the supplies are stock piled at the room neck or the central loading point and distributed from there by reversal of the gathering equipment. However, with the addition of panel or butt entry belts, or in complete mainline belt conveyor systems, the supply haulage becomes critical, for these units should not be reversed during the working shift. When they are reversed to handle supplies on the off-shift, the labor for handling supplies is in direct ratio to the points of rehandling, and there is the ever present danger of damage to the belt.

Shaking conveyor systems may distribute supplies from the room neck to the working face by dolly cars pushed manually inside the pan line. Another method is known variously as the "dead-pan," "double-pan," or "false-pan line." Spare pans are coupled parallel to the active pan line. There are installations of conveyors where light rail has been run next to the pan line to carry a supply car. In some operations, push carts are drawn on the bottom and a small cable reel unit has been developed which will haul supplies the length of the room. These same methods are more or less adapted to chain conveyor work, though reversing of the chains is most usual.

In rubber-tired gathering the coal carrying unit can be used to distribute supplies. Either a few props may be picked up from the supply pile by a shuttle car operator during a halt in the loading operation, or a supply man may use a spare car to distribute bits, etc. While this may be successful where supplies are at a minimum, in the closely timbered and heavily cross-barred mines the large volume and weight of timbers accentuates the supply problem.

If the gathering equipment discharges to panel belt thence to rail haul, another unit is placed in the way of supply distribution. Here not only rehandling becomes a problem, but timing as well. Double shift mines can employ a third shift supply crew but there are difficulties in obtaining third shift labor, and maintaining supervision. A triple shift mine is forced to sacrifice part of the working time for handling supplies, thus cutting into coal production.

In off-shift supply handling, the belt conveyors are reversed, usually at half speed. Idlers cut to train the belt now react to draw the belt out of line. This may result in edge wear, especially on the return run where most damage to the side of the belt occurs. Generally the supplies are loaded onto the belt piece by piece, and as men must be stationed at each point of distribution, considerable labor is involved.

Where panel belts discharge to other sections of belt, the extreme example being an all belt mainline, the rehandling is multiplied. It is the tendency in the use of long belts to establish a supply route so that men and material may move independent of the flow of coal. Where height is such that bottom need not be taken, some mines have paralleled the belt line with light rail track. Others run mobile supply trucks over well kept haulage ways. The pneumatic-tired equipment is battery powered and either of the truck or trailer type. In high seams a large load can be transported on a truck; however, as seam height decreases, carrying capacity becomes limited. By using a tractor, capable of drawing a number of trailers in a train, the carrying capacity is maintained by distributing the load over a greater length. There is also the possibility, where haulage is a combination of belt and rail, of transporting the trailers to the outside on flat rail cars, where they are loaded in the supply yard, returned to the belt head, and pulled from the car by the tractor.

This means that a single supply man can transport a full bulk load from the outside of the mine to the face. Rehandling is eliminated at the belt rail junction because proper equipment is provided to handle the bulk load as a unit. Belts need not be reversed since the load is pneumatic-tired mounted and travels a haulage way paralleling the belt. Finally, distribution is not done by face equipment.

Depending on haulage conditions and trailer loads, a number of trailers may be coupled together in a trip and drawn the length of the belt line. As the working territory is reached a trailer may be dropped from the trip and left ready for a section supply man to pick up and distribute, while the balance of the trailer train may go on without delay.

Where supplies are to be moved by pneumatic tire equipment over a mine haulage way, the success of the operation is proportional to the maintenance of the roadbed. Drawbar pull is dependent on tractive effort between the drive wheels and the road; consequently the better the road conditions, the higher the tractive effort and the more load the tractor can pull.

Handling Supplies and Repairs in Shaft Mines

By **H. A. Quenon,** Genl. Supt.,
Federal No. 1 Mine, Eastern Gas and Fuel Associates, Coal Division

THE difficulties of handling supplies and repairs in shaft mines are much more pronounced than in drift mines and under certain conditions can become a real problem insofar as operating the plant at a profit or loss is concerned. In the writer's opinion, the subject matter can best be illustrated by using one of our shaft mines as an example. This particular mine is producing up to 8,400 tons of coal per day through one 360-ft. hoisting shaft equipped with two cages working in alternate directions. The hoist is capable of handling the average 3.2 net ton cars at the rate of 3 per minute, however, this average cannot be attained due to inadequate capacities of the tipple, as well as occasional breakdowns, derailments, etc.

The mine can be equipped inside to produce 9,000 tons daily, operating the producing sections double shift and the dumping facilities 3 eight-hour shifts, as is being done at present. The shaft and tipple are the actual bottlenecks to that accomplishment. It therefore becomes apparent that any delay to hoisting of coal for any reason whatsoever is reflected directly back to a decrease in production.

All supplies that are loaded into mine

cars, as well as all major equipment overhaul jobs, must be transported through this shaft as the main shaft is too small to allow the accommodations of a mine car on the cage and can be used only for handling unit supplies.

During a six month period of time 40 cars of supplies per day were lowered down the hoisting shaft. This consisted of: 18 cars 7-ft. mine posts, 1 car 8-ft. mine posts, ½ car 11½-ft. mine posts, 2 cars wood and steel ties, 1 car motor sand, 3½ cars tamping material—dummies, 2½ cars cap pieces and wedges, 2½ cars rock dust, ½ car brick, 1¾ cars concrete blocks, ½ car safety blocks, spikes, etc., ½ car sand, lime, cement, 3 cars powder and caps, 2 cars oil and supplies, 1 car battery water, acid and mechanical supplies. This requires an average of 2 hours daily use of the hoisting cage, including handling of 40-, 60- and 85-lb. rails and removal of empty cars from cage for supplies.

During the same period additional supplies of the size and type not handled by the coal hoist were lowered down on the man cage.

The outside foreman has charge of supplies until they reach the bottom. He is furnished at the beginning of each day a list of complete mine requirements and with the exception of powder, caps and mine machinery or repair parts, which are dispatched inside first, the material is put down in no special order as to how it will be needed by the supply crews.

The bulk of supplies handled by the coal hoist is lowered into the shaft between 6 and 8 p. m., this period being chosen because of a natural lull due to man trips being dispatched from the bottom at the beginning of the second shift. During cessation of hoisting coal, supplies when lowered on coal cage are shifted onto the supply track by inside supply crews over a switch just in by the empty car haul chain. Supplies lowered during periods when coal is being hoisted travel the entire circuit of the empty storage track and are shifted to the main supply track at a switch inby the loaded car overpasses. This naturally creates delays to our main line haulage.

At 9 p. m. a supply crew consisting of 1 foreman, 7 timber handlers and a 2-man distributing crew begin work at the man hoist. The timber handlers lower 12, 14 and 16 ft. timber, pipe of less than 4-in. diameter, 15 ft. length rails and brattice boards. The crew is divided into two groups. Three men on top roll the timber to the shaft on skid logs where they are up-ended onto the cage and lowered to the shaft bottom. Here they are unloaded by the other 4 timber handlers and placed on timber trucks. Sharp curves, grades and limited amount of space at this point make handling of these supplies slow and tedious. There are also continual interruptions by personnel requiring use of the cage.

Recognizing the magnitude of this situation our company has, in conjunction with a ventilation project, prepared plans and commenced work on a shaft, outside and inside storage track layouts and adequate hoisting facilities to handle supplies and repairs in a much more efficient manner. The shaft, which has been completed, is centrally located on the mine property and will cut down inside travel distance considerably for repair parts and supplies. It is 14 ft. x 23 ft. 6 in. and is to be equipped with a cage 8 ft. x 23 ft. that will accommodate such equipment as loading machines, shuttle cars, mine locomotives and cutting machines (in some cases with bars removed) without having to dismantle them. It is estimated that daily savings of 112 man hours will be accomplished upon completion of the new project.

GATHERING HAULAGE

Effect of Large Capacity Mine Cars On Loading Machine Performance

By J. D. Reilly, Genl. Mgr.,
Underground Mines,
Hanna Coal Company

IN MY opinion, the only factors which should limit the size of a mine car for mechanical loading are the mining conditions of a given mine and the physical ability to handle the car. Certainly, the ideal situation would be one in which a full cut of coal could be loaded into one mine car, as this would give the loading machine an opportunity to perform for the major part of the working shift, but, since this is physically impossible, the nearer we can approach to this ideal situation, the more efficient our loading operation will become.

In many cases in the past when mechanical loading has been inaugurated, the companies have continued the use of the small mine cars which they had in use under hand loading, and there have been few, if any, instances where new large-capacity cars have been purchased along with the loading machines. This has been due, doubtless, to the financial inability to purchase all of this equipment at one time, or perhaps to a failure to recognize the need for the larger cars.

Bitter experience has shown this to be a three-fold error. In the first place, there is the fundamental principle, as stated above, that the largest possible mine car should be used to cut down the number of car changes required and thus to keep the loading machine loading coal a greater percentage of the shift. Second, instead of the hand loader loading, say, 3 tons on a 2-ton car by "cribbing" the car, it was found that the loading machine could not crib the car, and there was a sizable reduction in the amount of coal per car when the machines replaced the hand loader. Third, this loss in tons per car was accentuated by the fact that the loading machine, of necessity, put certain unmarketable materials into the mine cars, whereas the hand loader discarded such materials into the gob.

When many of us went to mechanical loading in our mines with the 2- or 3-ton cars which we had, it was an economic necessity for us immediately to do everything we could to make mechanical loading work with the handicap of the small cars. We exerted much effort and took much time in experimenting with various things to beneficiate our loading machine performance. We tried the use of two locomotives behind the loading machine, we installed longer rear booms on our loading machines, in order to load two of the small cars with one car change, we tried many new track layouts to cut our car changing time, and, in mines where roof conditions would permit, this latter expedient became a science of its own. These various expedients to which we went in order to make mechanical loading into small cars economical resulted in some cases in high tonnages per loading machine shift and I am acquainted with mines who, 10 years ago, were averaging 485 tons per loading machine shift with small mine cars.

Shortly after the installation of 10-ton cars at one of our operations, we conducted experiments to determine how much coal we could produce per shift with these large cars. For this experiment, we prepared sufficient places ahead and devoted the entire shift to loading the coal, and we were able on an 8-hour work shift to load out 32 places 18 ft. wide, 8 ft. deep and 6 ft. high, containing more than 1,100 tons. While we believe it is unreasonable to expect that we could procure day-to-day production of this kind in the immediate future, we do believe that the day should not be far off when we can expect a loading machine to load out 22 to 24 places per shift, providing, of course, that we give intensive attention to the things we have noted above. It is only with large cars that such performance can be obtained, and this only by a management which is alert and which uses its ingenuity in every way possible. Performance of this type with small cars is impossible, regardless of the exertion expended in the effort.

Time Studies to Improve Shuttle Gathering

By **David R. Mitchell**, Head, Dept. of Mineral Engineering and **Richard L. Ash**, Research Asst., Div. of Mining,
The Pennsylvania State College

MEMBERS of the staff of the Division of Mining of The Pennsylvania State College are currently making an engineering study of shuttle car gathering. As part of this study detailed time and method studies have been made at a number of coal mines throughout the United States. Not a sufficient number of field studies have been analyzed in the office to develop conclusively trends and characteristics for the various conditions encountered in operating shuttle car production units. This paper is in the nature of a progress report and the summation data presented herein must be appraised on that basis.

Time studies are useful in determining the characteristics of a particular method of doing work, and for determining deficiencies in production cycles. If properly utilized they furnish the factual information necessary to develop methods for improving the performance of machines, men, and production units.

Time Study Method. Since the characteristics of individual machines and production units as a whole are being studied, time studies of the loading machine and the shuttle cars in the production unit are made. This is usually done by stationing one man at the loading machine and one at the discharge station.

When field studies are completed for any one producing unit, results are com-

puted and subsequently an analysis is made. The preliminary procedure is to calculate the working times consumed by each separate time element, and then group these working times into useful totals. The totals are designed to include all related items. For example total trip time includes all times engaged in productive effort by the shuttle car. Delay times are grouped according to similar categories; e.g., those occurring at the discharge station, those occurring during traveling, and those due to natural conditions. Using these totals a graphic chart on a working place basis is constructed. Percentages on the basis of the entire time of study are also determined and charts constructed.

Mr. Mitchel then presented detailed data on time studies, summarizing the time losses, as shown in the accompanying tables and concluded as follows:

In conclusion, these time-study data show the procedures and items responsible for large time losses in the operation of shuttle-car production units. Improvements can be expected by improving those things responsible for large time losses. At many mines these are as follows:

1. Improve the coordination between the main line and section transportation systems by better design and supervision. Too much time is being lost by waiting for empty mine cars or by conveyor-belt stoppages, in turn usually the result of no empty mine cars at the discharge end of the belt.

2. Increase the size of the mine car to the maximum permitted by the size of the mine openings.

3. Use as large a shuttle car as can be used, and still allow the car to be maneuvered easily in the mine passageways.

4. Design sections to take advantage of the operating characteristics of the shuttle car and to minimize the effect of its limitations. The best performing shuttle car sections studied are those designed to provide a minimum of right-angle turns, standby positions close to the loading machine, short-haul distances, and non-conflicting travel routes particularly of the run-around type.

5. Improve maintenance procedures by adapting routine machine and roadway inspections and overhauls, and provide for an adequate supply of spare parts strategically located.

6. Improve face preparation practices in order to use more advantageously loading-machine capabilities.

7. Train men in good operational and maintenance practices with special emphasis on supervisors in production cycle coordination.

LOADING MACHINE EQUIPMENT TIME LOSSES FROM 30 STUDIES

Type	No. of studies having failures	Total No. of failures	Avg. time loss, minutes	Minimum loss, minutes	Maximum loss, minutes
Mechanical failures	15	21	16.4	1.7	55.4
Cable failures	4	5	19.9	4.6	50.6
Main power failures	6	11	1.6	0.7	4.4
Lubrication and inspection	8	14	4.4	1.1	11.3

SHUTTLE CAR EQUIPMENT TIME LOSSES FROM 46 STUDIES

Type	No. of studies having failures	Total No. of failures	Avg. time loss, minutes	Minimum loss, minutes	Maximum loss, minutes
Mechanical failures	17	21	24.9	1.2	63.3
Cable failures	10	12	20.7	1.0	32.3
Battery failures	3	4	8.7	2.7	20.7
Main power failures	10	14	4.4	0.8	24.1
Lubrication and inspection	10	10	4.4	1.0	15.5
Change batteries	12	14	23.6	9.0	63.8

PRE-FABRICATED TRACK FOR MOBILE LOADING

By Sterling S. Lanier, III, Asst. Supt., Norton Coal Company

NORTON Coal Corporation has used a prefabricated track system for a period of more than 2½ years. This mine is working the West Kentucky No. 11 seam which averages 6 ft. thick with a very soft bottom which ruled out the use of rubber-tired haulage. As track haulage was indicated, we planned for the largest car practicable to fit our conditions, an 8-ton steel drop-bottom car. This, together with the heavy mechanical loader—Goodman track-mounted type weighing over 17 tons, determined the weight of rail as 40 lb. We then attempted to develop a track system designed for maximum gathering speed.

The decision to use prefabricated track was a logical outgrowth of the desire to get away from the bottleneck of haulage and inefficient car changes in serving the loader. It was evident that track designed for maximum speed of gathering with long wheel base cars would always have to be laid with precision, particularly as to degree of curvature. The answer was to use rail and switches of standardized design to fit the panel layout, each curved rail curved to exact degree at the factory and each straight rail cut to standard lengths.

All turnout parts, except the curved stock rails, are interchangeable for right or left-hand turnouts. Steel ties are used —single rotary clip ties for straight track and double rotary clips for curved track. Four-pound ties were originally installed, but are now being gradually replaced with 5-lb. ties, as it was found that a heavier tie was needed with the soft-bottom condition. The life of the 4-lb. tie, however, will approximate three years of double-shift usage.

Each mechanical loading unit has three track men in its crew. On the third shift three men reclaim and distribute rail for the two loading shifts. This makes a total of 4½ men required to keep up the panel work for each loading unit. The track man's tools are a hammer, a wrench, the blueprint, and push truck on which to load rail as it is taken up. This track crew averages laying up about 18 places per shift including switches. Steel ties are spaced on 30-in. centers and four special ties are used for each switch. Tracks must be laid up within 5 ft. of the face so that the loader can reach the back of the 9-ft. cut. Two men lay a complete turnout in 2½ hours on an average. This includes time used in cleaning the place and collecting the materials. Our record time for laying a turnout was only 35 minutes, but all the ties and rail were already at hand in this instance. To lay a turnout, only one rail in the straight track has to be moved.

We have very little time lost that can be charged to derailment or other track troubles. During the first year when we had only one loader, lost time from derailment averaged five minutes per shift or less for many months. Now with three loaders and more congestion we are not doing quite so well. For the year of 1946 lost time from derailment of cars averaged 6.6 minutes per machine per shift, or about 20 minutes total per shift. Total lost time chargeable to track, for all reasons, averaged 9.1 minutes per machine per shift. We do have wrecks and have to watch the loading so as not to unbalance the cars with too much coal all in one end. This may tilt the car and cause one set of wheels to slew off the track. Also, we have some grades as high as 4 per cent and at these places we may have trouble at switches where one side is lower than the other. By blocking up the low side with boards, much of this trouble is avoided. It is extremely rare that any time is lost due to broken rails. During the whole 2½ years, replacements due to broken or lost rails has been 5 per cent, or about 2 per cent per annum. All broken rails are scrapped and replaced by the correct size from the factory.

We had thought that six keyroom sets of track, or enough for 18 rooms, would be required for each loading unit. We are using now, however, only four keyroom sets for each of the three loaders, with enough extra steel to take care of development work. As the cost of the track is approximately $3,000 per key room set or $1,000 per room, it has been quite a saving in the track investment to concentrate the working places. The total cost of track needed to work out one panel is approximately $12,000 for room track and about $3,000 for entry track. Where shooting on shift is prohibited, 15 rooms of track should be ample as breakthroughs would provide well over the number of places the loader could clean up in one shift.

To sum up, we have found the advantages of prefabricated track to be as follows:

1. Provides reliable fast haulage roads, making possible quick car change to high-capacity loading machines with large mine cars.

2. Track can be reclaimed from worked-out keyroom and moved to next place without alteration, with less wastage and breakage of rail.

3. Approximately 50 per cent saving in time and labor in laying track.

4. Saving in time lost from derailments and other troubles caused by defective track.

5. Safer for the men and easier on equipment as a result of fewer wrecks.

6. Insures systematic operation.

FACE PREPARATORY

Bug Dusters On Shortwall Cutters

By **Ralph Perry**, Chief Engr., Sahara Coal Company

ONE of the first labor-saving devices introduced in the coal mines was the Puncher machine; this was followed by the Breast machine and it, in turn, was succeeded by the Shortwall continuous cutter. The Shortwall and the succeeding higher-capacity slabbing machines eliminated a tremendous amount of hard work on the part of the miner and, in addition, they provided an opening cut under the coal which permitted the reduction of powder per ton, and which gave better preparation for loading. Loading machines of various types and designs followed the shortwall cutter, and today many of our mines are completely mechanized with labor-saving equipment. However, in none of these machines was any provision made for allaying dust, except that various types of water sprays are installed on mechanical loaders and cutters, and are used in some mines effectively.

We are concerned in this article with a discussion of the "bugdusters" on Shortwall mining machines. These further reduce the hard physical work and have a definite effect on the dust. Our experience at the one mine where we have used them makes us wonder why this gadget, if you want to call it such, wasn't thought of and adopted generally some time ago.

A brief description of its operation follows:

During the cutting operation the cuttings are brought back by the chain and bits, and when they reach the sprocket they are picked up or swept into the screw conveyor by a "Sweep." The Sweep is a plate with radial vanes on the top and is attacked to the bottom of the cutter chain sprocket. It should be added here that the design of the Sweep is important if all of the cuttings brought back are to be delivered to the screw conveyor directly behind it. The screw conveyor is at right angles to the long dimension of the cutter and is driven by an enclosed chain from the intermediate shaft of the machine. When the machine is being sumped, some dust is stirred up but as the bar gets under the coal this is practically eliminated. The discharge from the screw conveyor delivers the cuttings to the bottom of the pile forcing it up much in the manner of an underfed stoker; this action completely traps the dust. Whether the elimination of dust in this operation will make the use of water unnecessary remains to be proved.

The modern cutting machines make a kerf about six inches thick and when this is calculated into tons of coal for an eight-ft. cut and 30-in. feed per minute we have about four-tenths of a ton per minute or 24 tons per hour. It is safe to assume that three-fourths of this is brought back by the chain and bits, so it is easy to understand why no man can keep all the cuttings shoveled away. The result is that the major part of them are dragged back and packed in the kerf behind the bar which largely defeats the prime purpose of the undercut. To meet this, it has been customary to have men clean the kerf with long-handled flat shovels, which normally is very unsatisfactory and inefficient. The bugduster takes all the cuttings that are dragged back and discharges them to the rear, so it eliminates two operations of hard manual labor. In addition, the kerf is left relatively clear as all that remains is that portion of the cuttings that fall under the bar such that less than two inches of loose bugdust is left in the cut.

Some claims have been made that after adopting the bugduster there is less maintenance on the cutting machine. Our experience has neither proved nor disproved this, as we use the unit on cutters of the latest type, all of which are relatively new. When another piece of equipment is added, it is normal to expect some additional maintenance; however, this has been light so far as the bugduster itself is concerned because of the simplicity and ruggedness of its design. The screw conveyor is short and, while there is considerable wear on the discharge end of the spiral, we have lessened this by building up both ends of the spiral with hard-surfacing material.

To sum up, the advantages of the bugduster might be listed under these headings:

1. Clear kerf, and its advantages.
2. Labor saving by the elimination of the necessity of shoveling the cuttings and of later bugdusting the kerf.
3. Elimination of dust in at least one operation.
4. More safety by the elimination of one hazard and because of better visibility.
5. One of the final arguments is that our men working around and with it say it is the best piece of equipment in the mine.

Tire-Mounted Cutting Machines For Trackless Mining

By **G. R. Higinbotham**, Vice Pres.—Operations Consolidation Coal Co. of W. Va.

WITH the introduction of shuttle cars and tractor trailers for use in trackless mining, the old conventional shortwall cutting machines could not keep pace. The next step was to convert the mounting of the old track-type machines to caterpillar or rubber-tire mounting. However, these machines were not specifically designed for trackless mining and did not have a sufficient cutting capacity.

Mine management recognized that there was an urgent need for a high cutting capacity, trackless, universal cutting machine. After careful field investigation it was concluded that the required cutting machines must have a higher capacity than that of the loading machine to enable them to cut and move ahead of the loading machine. With the present type loading machines in trackless mining, we expect to average 600 tons per loading machine shift, which requires a cutting machine with a capacity of 900 to 1,000 tons per shift.

Our experience with the tire-mounted cutting machine is limited to the Pittsburgh Seam in the Fairmont Field. We have had tire-mounted cutting machines in operation for 18 months. The thickness of the coal is about 8 ft. and is overlaid with 12 in. of what is commonly known as draw slate. This draw slate is simply a shale which, after a few days or sometimes hours of exposure, disintegrates and falls. To prevent this occurrence, it is the practice to leave some 8 to 12 in. of hard coal. This is best accomplished by top cutting, as with bottom shooting there is no shattering effect on the roof coal that must be left in place.

Upon completing the horizontal top cut, the cutting crew sets a temporary cross bar on two timber jacks within three ft. of the face. The cutting machine is used by the cutting crew in raising the cross bar to the roof and supporting it while the timber jacks are being set. Next, the vertical shear is made approximately five ft. from the right rib. This shear increases loadability of the coal. Then, the cutter bar is used to scrape the cuttings toward the center and away from the face of the place. This facilitates the work of the drillers who follow.

Since the boom swing on the tire-mounted cutting machine is limited to 30 degrees because of the large front-drive wheels, it is necessary to slew the machine across the face to cut the full width of the place. The proper method of performing this task is to be sure the cutter bar is in the coal to its full depth. Then, under the machine's power, it is lifted over. It is necessary to slew the machine over two to four times per cut, depending upon the width of the face.

The pneumatic tires, which are 14- and 10-ply construction, have stood up exceptionally well under such severe conditions. The original tires are still on the machines and should be good for quite a while yet.

We have machines which have been equipped with valves to control the flow of hydraulic fluid to the tramming motors. Normally, these valves are open. When one wheel is on firm pavement and the other wheel is spinning, the valve to the pump for the wheel that is spinning is closed so as to restrict the return flow of the hydraulic fluid. In this manner the power is diverted to the wheel which possesses the more traction. The manufacturer is now developing an automatic valve to replace the present manually operated ones. When both drives are deep in the soft pavement or mud it may be necessary to tow the machine out.

The results of time studies and performance records are given in some detail and the paper concludes with the following summary:

Advantages:

1. Being universal—will cut any part of face vertically or horizontally.
2. Fast tramming speed.
3. Fast cutting rate.
4. Possess versatility and mobility; can cut ditches, shallow sumps; shear down dangerous brows; also shear the recess in the top at the ramps and have cut the excavation for an overcast; flexibility.
5. A relatively safe machine for the operators, from the standpoint of being under the protection of cross timbers.
6. Accessibility for repairs—the machines never leave the sections for repairs.
7. Dual centralized hydraulic controls—easy to learn and easy to operate.
8. Hydraulic steering.
9. No time lost in unloading, setting up and reloading, which is not true of the shortwall.

Disadvantages:

1. Breaks up soft pavement when slewing or when the wheels spin.

2. Inability to power itself through mud and unfirm bottom.

3. Only six-in. clearance below front axle.

4. Necessity to slew machine at face to get full cut results in cutter bar damage.

5. The over-all maintenance cost is too high for the rubber-tire mounted cutting machine.

6. Any erratic maneuvering may catch the operator or other workers between the machine and the ribs or posts because the rubber-tire mounted machines do not travel in a definite line of direction which is pre-determined for the track machine. So far, we have not experienced any injuries from this hazard.

Tire-Mounted Drills For Trackless Mining

By C. M. Shott,
Vice President
Sheridan-Wyoming Coal Co., Inc.

THE Sheridan-Wyoming Coal Company, Inc., began with the mechanization of its mines in 1925 and have progressively advanced with the trend of the industry. In line with the company policy of constant improvement in equipment and mining methods, we began a study in 1937 on a more highly mechanized program and this was carried on over a period of two years. All types of equipment adaptable to our operating conditions were carefully considered. In the fall of 1939 it was decided to install high-capacity mobile type trackless face equipment; this went into operation in the spring of 1940, and at the present time we have six producing sections.

A working territory consists of six rooms driven 25 ft. wide on 50-ft. centers, the first room being turned at 100 ft. to provide a barrier about 80 ft. thick along the panel entry. Rooms are necked for two to three cuts 15 ft. wide, then widened to 25 ft. Cross-cuts are driven on 70-ft. centers and pillar recovery starts as soon as the rooms have been driven up.

Hand-held electric drills were tried in our operation in 1925 but, due to the tough and woody nature of the coal and the tendency of the auger to grab and, furthermore, the extreme height of the coal making it necessary for drillers to work on benches, made this method of drilling a slow and dangerous operation and hand-held electric drills were discarded. Post-mounted electric drills were then adopted and one drill was placed with each cutting machine. This type of drill proved satisfactory in drilling enough holes per shift to keep up with the small-capacity cutting and loading equipment in use at that time.

The Sullivan CD-16 rubber-tired, self-propelled drilling machine was selected because it offered, under our conditions, the greatest flexibility and speed of movement from place to place, thus reducing non-drilling time to a minimum. We had to have a machine able to drill enough holes to keep up with the cutting machine in order to prepare sufficient coal for our loaders, which have loaded up to 950 tons per shift, and over a several-months period have maintained an average of 750 tons per shift per unit. With this machine our drillers have been able to carry on their task at a uniform pace avoiding the necessity of always being "pushed" to keep up with the cutting machine. Our drilling crew consists of two men.

Rooms yield 80 to 90 tons per cut and entries 50 to 60 tons. We have drilled up to 160 holes per shift. We are considering at the present time certain improvements in our mining system which we expect will give us still greater production from each loading unit, and in order to increase our drilling capacity we plan on installing an extra drill boom on our present drill chassis.

In conclusion, I wish to state that our experience with this type of drill has been highly satisfactory. With mobile type of equipment much depends on the state of maintenance, and in this respect we have a full-time mechanic stationed in each loading section, and our equipment is maintained at a high standard. Our mining system is planned with the object of utilizing our equipment for maximum production at all times consistent with good safety practices and maximum recovery.

Mine Timbering Machines

By Harry S. Gay, Vice Pres.,
Gay Coal & Coke Company

MINING operation in the No. 1 mine of the Gay Mining Company began May 4, 1942, in the lower bench of the Cedargrove seam in Mingo County near Gilbert, W. Va. The thickness of the vein is very irregular and varies in height from six to nine ft. On account of the varying top conditions, two 6-in. x 8-in. x 14-ft. headers are set in each place after each cut, which is eight ft. in depth. All places are 18 ft. wide and all breaks and turns are at 60 degrees. Taking of pillars has been deferred pending the mining of a 50-in. upper seam 80 ft. above in which territories are now being developed.

The first timbering machine was built out of old second-hand truck parts and put into operation in the fall of 1942. This machine, when it operated, proved to us that one well-designed and built out of new material would cut timbering cost and at all times have the places timbered in time so that the cycle of operation would not be delayed. The second machine was built by Mr. Tom Maynard in his shop in Williamson and incorporated certain improvements recommended by our superintendent, Mr. F. E. Vincent, and our chief electrician, Mr. Freeland Estep.

The chassis is a reinforced 1½-ton 1940 Ford truck chassis, the platform is 16 ft. long by 7 ft. 2 in. wide, and the total over-all length, including the driver's cab, is 22 ft. 6 in. The platform of the machine is 38 in. high. Tires are 700 x 20, 10-ply, with dual wheels on the rear axle. The tramming motor is 15 H.P., the hydraulic lift motor 3 H.P., and the saw motor 5 H.P. All are 275 V D.C. and powered through cable and a General Electric CY21 reel. The machine is controlled by a steering arrangement similar to that on a shuttle car and is very flexible in movement, traveling anywhere that a shuttle car will go. The saw is circular, disappearing, cut-off type, with swinging arbor, and is located on the rear of the machine.

Mounted on a hinged bearing in the center of the bed is a steel cantilever arm that extends back over the rear half of the platform and is raised or lowered hydraulically. The end of this arm has a saddle which turns on a thrust ball bearing and on which the cross arm is placed. The arm is elevated to bring the cross arm up against the mine roof. As the saddle rises, it remains level, but is swiveled so that the timber can be rotated to its desired position. The hydraulic jack has sufficient power to hold the bar against the top until the posts are in place. The bed of the truck will carry 12 cross bars and 24 posts, including cap wedges and tools. Rollers placed at advantageous locations assist the men in sliding the headers on to the saddle.

The present rate of a timberman for the first five days, figuring the overtime, is $1.316 per hour. It therefore costs .855 cents to set timbers in one place, compared with $4.056 without the machine.

Using one loading machine and two shuttle cars, the average production in eight hours at the face is 650 tons; larger productions have been obtained by using a second loading machine with the two shuttle cars. The same timber crew was able to take care of the increased number of places required. Using three timber men with the machine and one loading machine, the timber cost per ton when 650 tons were loaded would be 5.4 cents a ton. This would be reduced to 4.7 cents a ton if a second loading machine is used and the production increased 100 tons per shift.

The fourth machine, which has just been built by Mr. Maynard, is 30 in. high over the fenders. The bed is 26 in. high. The machine is 20 ft. 8 in. overall, with 11 ft. wheelbase. It is 5 ft. 8 in. wide at the cab end and 6 ft. 11 in. wide at the rear end. The lifting arm consists of a short piece of double strength pipe mounted on a turntable and located about four ft. from the rear of the machine. The saddle, which is similar to that used on other machines is attached to a movable piece of double-strength pipe, which fits into the piece of pipe that is raised by the hydraulic jack. Different length pipes can be used, depending on the height of the seam. The machine is designed with the idea of using it in veins of different thickness. The hydraulic jack and lifting arm assembly are attached to a turntable which is suspended below the bed of the truck, so that the lifting arm can be turned at right angles to the truck. Part of the bed is left open at both sides through the center of the turntable, so that the jack will not come in contact with the bed of the truck and thus prevent the lifting arm from turning.

The machine is powered through a CY21 General Electric reel and steered like the other machines. It is driven by a 29J Reliance motor suspended below the bed parallel to the chassis and transmitting its power through a Dodge 2-ton differential. We have never experienced a machine hung up in bad bottom similarly to the usual trouble encountered when trucks get stuck in mud. There is nevertheless such a possibility with this construction. It can be eliminated, however, by installing the new type of truck differentials designed to overcome this difficulty.

The headers are carried on the bed of the truck, while the posts are carried in pockets on each side and between the front and rear-wheel fenders. They are 7 ft. 9 in. long and 20 in. wide. Pin standards on the sides of the pockets enables the posts to be piled on top of one another, so that as many as 20 small or 12 large posts can be put on the machine when fully loaded.

STRIP MINING

New Developments Necessary For Strip Mining

By J. W. Woomer, Mining Engr., Wheeling, W. Va.

THE statistical progress of coal stripping, insofar as its increasing tonnage is concerned, shows that in 1937 only 7 per cent of the United States production was from stripping while in 1946 it was 19 per cent.

World War II nearly doubled the production. It was easier to develop new mines by this method. Stripping required a small amount of scarce equipment and fewer man hours per ton. It also recovered more coal per acre exploited. Its principal expansion was helped by a quality-tolerant market. A survey indicates that, based upon a normal United States total coal production, stripping by pre-war substantial operators with modern equipment for pit work, good preparation, facilities and with average reserves for 25 years, will continue to supply 8 per cent of the anthracite and bituminous production. In addition to this, there is sufficient evidence to estimate that another 3 per cent of the nation's production will come from new operations which will emerge from the war period with adequate reserves or reserve possibilities to sustain economical installations. We estimate, therefore, that for the next 25 years about one-ninth of our bituminous and anthracite coal will be produced by stripping.

As a result of this study, present operations and, what is more important, present reserves, fell into three main classifications as follows:

(a) Short-range operations to low overburden limits (35 ft.).

(b) Short-range operations to medium overburden limits (45 ft.).

(c) Long-range operations scheduled for high overburden limits (60 ft.-80 ft.).

Historically, these two classes of short-range work have contributed little to basic long-range stripping practice over the past war years. While many ingenious techniques have been developed by operators to meet various equipment and reserve deficiencies, there has been little real engineering planning done by the operator on stripping, haulage, drilling and blasting or on preparation. The manufacturers of equipment and materials suitable for such work have made some findings that will be beneficial to the long-range program. Among some of these are:

The application of long booms and sticks to quarry-type machines.

Improvements in carry-all and scraper type of equipment.

Experimental alloy steel drilling.

Use of amplidyne and similar shovel and drag controls for better flexibility.

Application of Ward-Leonard to 4- and 5-cu. yd. shovels.

Use of Air-Flex clutch.

Advancement in explosives and explosive loading.

Special trucks for auxiliary operations.

Now let us look at this job labeled "long range." What is it? Based upon this report's forecast of this job, there are nearly 750,000,000 cu. yds. of overburden to be moved per year. There are 57,000,000 tons of coal to be loosened, loaded, hauled and prepared each year. There are 37,000 tons of explosives to be drilled for, charged and shot each year. It is an engineering undertaking where in some cases one overburden casting machine will cost as much as $1,000,000. It is a financial undertaking that requires the best talent available to study the economics. There can be no guess work here in prospecting, machinery, application, earth-swelling percentages, earth angles of repose, transportation layouts or preparation.

Mr. Woomer ended his paper with a detailed tabulation of necessary new developments common to the requirements of both operators and manufacturers.

Drilling and Shooting Practices in Anthracite Strip Mining

By G. A. Schnee, Div. Engr., Phila. & Reading Coal & Iron Co.

THIS paper will be limited to a description of the practices at two stripping operations where geology, overburden and coal beds are representative of the conditions prevailing throughout the entire area. One of these, known as the Monitor Stripping, is located in the Western Middle Field; and the other, known as the Beechwood Stripping, in the Southern Field. Both strippings are operated by independent contractors for The Philadelphia and Reading Coal & Iron Co.

At the Monitor Stripping fourteen drills, all using 9-in. bits and working three shifts daily, are employed to maintain sufficient blasted overburden ahead of the shovels. Three of the drills are the 6-in. type equipped with a 9-in. bit and a heavier stem to make all of the holes of uniform diameter. The 9-in. drills carry drilling tools weighing 5,000 pounds, and the 6-in. drill tools weigh 3,200 pounds.

A caterpillar-mounted wagon drill is used for drilling some of the divider rock between the veins where it would be too difficult to set up well drills. This drill operates by compressed air both for drilling and moving. Power for the drill is supplied from a 315-cubic foot semi-diesel air compressor mounted on a truck.

Detachable bits are used, and the holes are usually started with a 4-ft. piece of steel using a 3-in. bit. Each piece of drilling steel is increased by 4 feet, and the bit gradually reduced to 1¼ inches.

Between October 1940 and December 1942, a study was made on drilling performances which covered a total of 644 shots or blasts. During this period, 442,904 feet of hole was drilled, at an average of 26.6 feet per drill for a 7-hour shift. Surveys were made by transit after the shot material was cleaned up to determine the number of cubic yards of material blasted. From this data it was estimated that there were 7.6 cubic yards of overburden blasted per foot of hole, or 203 cubic yards per drill shift, for a total of 3,400,000 cubic yards.

Drill holes are staggered and are spaced on 12-foot centers for hard rock, and the spacings extended to 18-foot centers for softer material such as shale. All drilling is in charge of a drill foreman who is a qualified drill operator and repairman. He also specifies the location of the drill holes and oftimes fires the blast.

The 9-in. holes when wet are loaded with a 40-per cent gelatin-type dynamite, and the dry holes with a 40-per cent ammonia type. Cartridges are 7½-in. x 20-in. and weigh 50 pounds. When the holes are drilled to coal, 2 ft. of stemming is put in the hole before the charge is placed. The load is then decked according to the strata cut and recorded by the drillers, and each hole is loaded with 150 to 200 pounds of dynamite. All firing is done with Primacord detonating fuse, and the stemming used in the hole is exclusively fine material as the smallest-size rock in the stemming may cut the detonating fuse and cause a miss-hole. Approximately 13 to 16 ft. of stemming is placed on top of the deck load.

At Beechwood three veins are being stripped: the No. 11 or Primrose Vein which is 10 ft. thick, the No. 10 or Holmes Vein averaging 5 ft. in thickness, and the No. 8 and No. 9 or Mammoth Vein which varies in thickness between 36 feet and 155 ft. All of the veins are on a single dip and were previously mined. The rock strata in this stripping consists of 5 per cent conglomerate, 60 per cent hard sandstone and 35 per cent slate. When completed, the stripping will have a maximum vertical depth of 400 feet.

In order to keep shot material ahead of the dragline, 7 drills are operated on 2 shifts daily. All drills use 9-in. bits, and the total weight of the tools is the same as those used at the previously described Monitor Stripping.

The stripping is worked on 100-ft. benches or levels. Holes are drilled 110 ft. deep or 10 ft. deeper than the floor of the bench.

Drill holes are staggered and are spaced on 21 ft. x 24 ft. centers and extend to 27 x 27 ft. centers depending upon the strata cut in the holes. As this contractor maintains his own engineering staff, each blast is carefully planned. The holes are staked out by the engineers before drilling starts and located after completion. From the record kept by the driller, cross sections are then constructed showing the depths of the holes and the strata cut. The loading of the holes is later shown on the cross sections for further study.

Nitramon, which is packed in tightly sealed metallic containers, is the principal blasting agent used at this stripping. The cans are lowered into the holes with a small portable windlass, and the holes are usually loaded solid up to within 18 or 22 ft. of the top. Stemming is used the remainder of the distance. The sizes of the cans vary from 8½ in. x 24 in. to 4 in. x 24 in. The strongest bulk is equivalent to 85 per cent gelatin type dynamite and the weakest bulk to 40 per cent ammonia type dynamite.

A primer can, to which Primacord detonating fuse is attached, is necessary to fire each hole; and where the column of Nitramon exceeds 42 ft., an additional primer is used. It is also necessary when decking a hole to use a primer for each deck load. All firing is done with Primacord detonating fuse.

Drilling and Shooting Practices in Bituminous Strip Mining

By **Fred Horne,**
Sinclair Coal Company

THE drills that I want to devote the major portion of this paper to are a combination of Bucyrus-Erie Model No. 42T churn drills and Sullivan Model No. 46 rotary drills plus some engineering design of our own company. These drills are propelled on a caterpillar type tread 36 in. wide and 13 ft. 7 in. in length. The tractive power of these drills is very great with any kind of footing at all under them. When there are holes to be drilled in swampy ground or a pond bed we have never hesitated to send a drill in after them as long as one drill can be kept near on solid ground.

These drills use a drill stem fabricated from 3½ in. x 3½ in. x ⅝ in. x 30 ft. angles of high tensile alloy steel which makes a 4-in. square hollow stem. The stems must be hollow to allow water to be forced down through them for the dual purpose of washing the cuttings out the top of the hole around the outside of the stems, and also for cooling of the bits. The stems are connected by tapered threads. Rotary rock bits are used which employ rotating cutters. The rotating cutters prevent excessive wear that occurs in fish-tail or moles-foot cutting heads, especially in hard and abrasive formations. A short section of spiral wrapped pipe is used between the end of the stem and the cutting head to facilitate the starting of the upward movement of the cuttings. The total tool weight does not exceed 1,800 or 1,900 lbs.

The trend in strip mining is toward larger bore holes and I would like to suggest that all stripping operators give serious consideration to increasing the size of their drilling equipment to produce larger holes if their overburden warrants it. Most drilling equipment has been increased in size over the past several years, virtually eliminating the necessity of springing holes which is highly desirable both from the standpoint of expense and safety.

During the past several years the explosive manufacturers have increased the blasting efficiency of their lower priced explosives, namely the low density, high ammonium nitrate content dynamites and the dynamite cored black powder explosives. In addition, such physical characteristics as uniform diameter and water resistance of the cartridges have been greatly improved.

One problem that some stripping operators have been confronted with and is also a potential problem for most all operators is legal action resulting from alleged damages to property supposed to have been caused by vibrations caused by blasting.

Any operator confronted with such a lawsuit or who is liable to be confronted with such a suit should immediately have such measurements taken and recorded and a report prepared for the defense attorneys' use. It is poor policy for the operator or any employe of an explosive company to attempt to take such measurements, but instead a disinterested individual or engineering firm of unquestioned integrity and background should be retained.

After any legal action has been initiated the action described in the preceding paragraph is the major defense of an operator, but any operator can practice "preventive medicine" by using short period delay electric blasting caps. These fractional second delay blasting caps have been developed in the past few years and have a time lag of from 25 milliseconds (.025 seconds) to 150 milliseconds between the time when the electric impulse is applied to the cap and the time the detonation occurs.

Seismograph records have definitely proven that vibration is considerably lessened where such blasting caps are used and this is so for the simple reason that the short interval of time between certain of the shots reduces the vibration because a smaller quantity of explosive is actually shot at a given time. Also these caps greatly reduce the noise of blasting, which in most cases is the factor that first causes the public to become aware of such blasting. These caps can be used in any number of combinations and in many cases breakage is improved because of the "relieving action" and additional stressing obtained with the short period delays.

Methods of Handling Overburden in Anthracite Strip Mining and Factors Determining Practices

By **J. Robert Bazley,** President,
J. Robert Bazley, Inc.

ANTHRACITE strippings are generally classified into the following types—crop, basin, anticlinal or a combination of two or all.

For the most part, the predominant stripping of the past has been the crop stripping. Anthracite measures are seldom flat, but rather follow the contours of the earth's surface, which in the anthracite region is folded, deviating only to the extent that weathering has eroded the slopes or deposited wash in the valleys.

Today's practice in extensive crop strippings is to use draglines of sizes from 5 to 25 cu. yds. capacity with booms of 150 ft. to 200 ft. in length. The determining factors in the selection of a dragline for this work are several:

(1) The thickness of the vein which may vary from 3 to 60 ft.

(2) The pitch of the vein which may vary from 0 degrees to 90 degrees or even to an inversion.

(3) The nature and volume of the overburden and the area available for cast and recast.

(4) Availability of areas for cast banks providing ample allowance for swell. Physical improvements at or adjacent to the project such as railroads, slopes, highways or buildings.

(5) Economic limit of recasts if recasts are necessary.

(6) Efficiency of dragline at depths—draglines become only hoisting machines at depths greater than 65 per cent of their boom length and for the most part, slow and inefficient.

Here Mr. Bazley discussed specific operations showing how the stripping equipment is applied for combinations of both dragline and haulage work.

My own company has recently undertaken the removal of the overburden from a basin or syncline with the combined use of tournapulls and a 7400 Marion dragline using a 200-ft. boom and an 8-yd. bucket. This operation involves some recasting due to the pitch of the syncline, and we are not unaware that it may possibly develop that other haulage may be needed to take care of the overburden due to the "piling up" that will occur in the center of the syncline due to the pitches on either side of the basin being greater than the angle of the rest of the material cast. However, the overlying material is conducive for low cost shovel loading and scraper work, and we feel that reducing the height of cut will make it possible to obtain a *cost* better than from a straight shovel and haulage because the *lower benches* are the most costly to remove by haulage, and this will be done by dragline.

The exposure of greater areas of "bottom rock" by stripping to greater depths can create a real hazard. The tendency for the seam of rock underlying the coal to slide increases with exposure. To overcome this hazard, careful planning must be made, especially where pitches are over 40 degrees.

Present day anthracite strippings of large size are being planned to great depths. In these proposals, there is a preponderance of combined crop and anticlinal or synclinal work. For this reason, today's trend seems to be toward the use of combination excavating units. Heavy duty shovels are used with modern truck haulage and the dragline is used to augment the shovel wherever it is feasible.

Large Walking Draglines in Bituminous Strip Mining

By **Lafe Stewart,** Chief Egr.,
Maumee Collieries Company

WE HAVE given much study to methods of digging procedure which would reduce the overall cycle time of the large dragline. One of the most potent factors in reducing the cycle time is minimizing the time required for hoisting the bucket. Very commonly it is observed that the dragline is retarded on the swing while waiting for the bucket to be hoisted to the desired height. Even with the high hoist speeds available on the newer large draglines this seems to be the case. We have also found it essential to keep the angle of swing low in face digging, which makes it even more important to lay out the operation so as to reduce hoisting time.

Our large draglines operate from a bench prepared ahead of themselves both by excavating surface material and by spreading shale from the pit on the bench floor to provide good footing. Benching is usually necessary for several reasons,

among which may be mentioned, providing a level surface from which the machine can work, reaching material in the overburden solid enough to give proper footing, and in some cases to gain desired spoiling range through working at a lower level so that the highwall slope enable the machine to work closer to the spoil.

At our No. 23 mine southwest of Linton, Ind., we had a Bucyrus-Monighan 15-W walking dragline with 215 ft. boom and 13 cu. yd. bucket, working in tandem with a Marion 5480 shovel. With this combination we successfully handled overburden as deep as 73 ft. One of the numerous difficulties encountered in the operation was extensive unmapped old workings from former underground mines. Drilling of course demonstrated their presence and also their location with some exactness. We knew that in one place they bordered our coal seam on three sides. Also, we had some troublesome ground water conditions.

With the 15-W working on the ground surface we were able to delimit these old workings exactly without any danger of our excavating unit bogging down in them. Once the old workings were exposed, we could determine how close to them it was safe to use our stripping shovel and loading unit. Further, we used the 15-W to recover coal present in patchy areas almost surrounded by the old workings, which were too small to maneuver the shovel into, if indeed we could have worked the shovel into these areas in the limited space provided by coal remaining between the old underground entries.

We also operate Bucyrus-Monighan 5-W and 10-W walking draglines. The 5-W machine has been a jack-of-all-trades, working variously as a drainage unit, as a booster machine located on the spoil and pulling back material from stripping shovels in deep overburden, and as the primary excavator in small operations. It can be dismantled and shipped from place to place with relative ease, yet has sufficient capacity to make itself very valuable.

The 10-W machine has been the primary excavator at our No. 17 mine east of Clay City, Ind., for almost 11 years. We think that this particular property could not have been mined successfully by any tool other than the walking dragline. It has handled a long succession of short pits, odd-shaped pits, pits located on patchy coal, pits encumbered by old workings, and overburden up to 66 ft. deep over the No. 2 Brazil Block seam which ordinarily is about 3 ft. thick.

Armor Plate Steels Increase Capacity and Range of Stripping Shovels

By A. F. Busick, Jr., Chief Engr., Marion Power Shovel Company

SINCE the inception of the coal stripping industry excavator designing engineers have kept constant pressure on the problem of increasing both the range and capacity of stripping machines. The need for both range and capacity grew in intensity as strip miners were faced with increasingly difficult problems resulting from working out areas of lighter overburden. They were forced to turn to reserves overlaid with from 50 to 100 ft. of overburden which in many cases was largely rock or shale. To give them machines that would solve their problems at an economically practical overall cost stood, and still stands, as the coal stripper's principal challenge to the power shovel industry.

During the war we began hearing some impressive stories about the characteristics of some new armor plate steels. When information was available on a piecemeal basis, we began exploring the possibilities the new steels might hold for us and the stripping industry. We were convinced they would permit us to go well beyond the limitations of low alloy hot rolled steels, which had found general acceptance prior to the war.

These new steels—for there were several—had been developed and produced during the war for tanks, gun mounts, etc. Most of them were comparatively low alloy steels to conserve dwindling supplies of alloying elements, but extremely high physical properties were obtainable by proper heat treatment. A number of steel companies developed facilities to quench and temper rather large plates in heavy tonnages and we were advised that these facilities would be available after the war and we could count on a commercial supply of these steels for industrial use. Several analyses were used by the various steel companies, most of which were heat treated to obtain yield strengths in excess of 100,000 p.s.i. and tensile strengths from 125,000 p.s.i. upwards. All had high impact strength and retained this strength exceptionally well in sub-zero temperatures.

Early studies indicated that these high strength steels as developed for ordnance use were of doubtful practicability because no welds could develop the full strength of the sections. Furthermore, design limitations prohibited taking full advantage of the properties available because of the extremely thin sections that would be obtained. A modification reducing the carbon content made welding more feasible and developed physical properties of 80,000 p.s.i. yield strength and 100,000 p.s.i. ultimate tensile strength. These properties lent themselves readily to design problems and gave 50 per cent greater strength than was previously available in the so-called high strength structural steels.

While these steels were being produced, another type of high tensile steel was developed. This was an austenitic manganese steel alloyed with chromium, nickel and molybdenum. In the hot rolled condition it had a yield strength of 80,000 p.s.i., an ultimate strength of 120,000 p.s.i., elongation of 40 per cent and a reduction of area of 55 per cent. Its special characteristics, from our viewpoint, were resistance to abrasion combined with high strength and ductility. Because it is high premium steel, its economic use for abrasion-resisting parts such as dipper shell plates, door plates, etc., is yet to be fully determined although it is being used in several of our large dippers at the present time.

Mr. Busick then discussed the problems of design of dippers and changes in machine construction necessitated by the adoption of the new steels and concluded with the following:

You, as owners and managers of strip mines, are interested primarily in the improvements in performance you can expect from shovels of today and tomorrow as a result of the development and application of new armor plate steels. Our experience convinces us that applications such as the ones I have just described are economically justified and are sound when judged in the light of practical field experience. Additional applications of these steels in the power shovel industry are of course, entirely dependent upon economic considerations. At this time we are satisfied that lower cost per cu. yd. may be obtained by the use of modified armor plate in places where the live load carried can be increased by the amount of dead weight saved in moving parts.

Not only is the operating labor reduced per yard of material handled due to the increased hourly yardage but the investment required per yard of machine capacity is lowered also. This is because the additional dipper capacity is achieved at about 40 per cent of the investment per yard required for the basic machine. Of course where the weight saving is used to obtain increased range instead of increased capacity the problem is more complex and the economics will have to be investigated for each individual job. However, with the new 40-yd. machine as built today, we get not only a larger dipper, but some increased range also, and the investment per cubic yard of machine capacity is still less than the old standard 35-yd. unit.

In conclusion, I wish to give full credit to those of you who have had the foresight and courage to work with us—yes, even urge us on in this particular development. Your willingness to risk the production delays inherent in the adoption of new materials and new designs has greatly accelerated the application of armor plate steels to excavating equipment.

We have perhaps only begun to see the possibilities opened up to equipment designers by armor plate steels—possibilities which will eventually help coal strippers and other users of excavating machinery to move more material at lower cost. Human desires are never satisfied—the road to progress ever beckons us onward and we look forward with confidence to still greater achievements through the constant application of better materials, new designs and improved processes of manufacture.

Reclaiming Stripped Lands

By the **Land Use Committee** of the National Coal Association

ON Thursday morning, May 15, a panel composed of representatives from a number of strip-mining states presented and discussed some interesting papers on land reclamation. This meeting was held under the auspices of the National Coal Association, who will present the proceedings to the coal industry. The papers, therefore, will not appear in our Year Book.

Personals

The Lead Industries Association early in May held an annual directors and executive committee meeting at the Waldorf-Astoria Hotel in New York City.

Clinton H. Crane, St. Joseph Lead Company, was reelected president and **F. W. Rockwell**, National Lead Company, was reelected a vice-president. **K. C. Brownell**, American Smelting & Refining Company, was elected to succeed F. H. Brownell of the same company as a vice-president, member of the executive committee and board of directors. **Robert Lindley Ziegfeld** was named acting secretary and treasurer.

The following were elected to the executive committee: Mr. Crane, chairman: Mr. Rockwell, Mr. Brownell, F. F. Colcord, U. S. Smelting, Refining and Mining Company, and L. E. Hanley, Hecla Mining Company.

Robert N. Smith resigned recently as superintendent of the Black Eagle Smokeless Coal Company at Black Eagle, W. Va., to accept a position with the Mine Safety Appliances Company of Pittsburgh, Pa.

Howard G. Washburn, Wallace, Idaho, retired June 1, after 17 years of service as general manager of operations of the Federal Mining & Smelting Co., and affiliated companies in Idaho, Missouri, Kansas, Oklahoma and Montana. He will be succeeded by **J. E. Berg**, Wallace, at present assistant general manager. Mr. Berg has been with the company since 1923.

Brig. Gen. Hugh C. Minton, who was awarded the Distinguished Service Medal for his "able direction" of the Army Service Forces' Production Division during World War II, will become production manager of Koppers Co., Inc., on July 1, it was announced May 11.

In his new position, General Minton will report directly to Gen. Brehon Somervell, president of Koppers, thereby reestablishing in civilian life a relationship set up in wartime when General Somervell was commanding general of the Army Service Forces.

General Minton's new assignment in Pittsburgh brings him back to the city where he served during nearly five years of his Army career. He was executive assistant to the Chief of the Pittsburgh Ordnance District from August, 1935, to July, 1938, and returned to Pittsburgh as Chief of that Ordnance District from July to November, 1942.

Merrill E. Shoup, president of the Golden Cycle Corporation, was one of 11 Colorado men elected to the board of directors of the Denver & Rio Grande Western Railroad, at a recent reorganization meeting in Denver.

The research and development division of Pittsburgh Consolidation Coal Co. has announced the appointment of **Dr. Howard S. Turner**, of Swarthmore, Pa., as assistant director of the research and development division, with offices at the company's research center at Library, Pa. In accepting this position, Dr. Turner resigned from the Du Pont Co., Wilmington, Del., where he had been employed for 11 years in research and development work.

Born in Jenkintown, Pa., in 1911, Dr. Turner was educated at Swarthmore College and at Massachusetts Institute of Technology, where he received his doctorate in 1936 after majoring in organic chemistry and fulfilling his minor in chemical engineering. During the war he served as a consultant on technical committees for the Army Quartermaster Corps.

Russell P. Fitch, for the past year on the engineering staff of Burro Chief Mines at Tyrone, Grant County, has taken a position with the Empire Zinc Company at its property at Gillman, Colo.

Percy W. Donovan has resigned as vice-president and manager of the Contract Drilling Division of E. J. Longyear Company as of June 6, 1947, after completing 42 years of active service.

He was elected to the Board of Directors in 1916 and will continue in this capacity for a time and, in addition, serve as consulting engineer as required.

President Earl C. Robertson of Consolidation Coal Company, sales subsidiary of Pittsburgh Consolidation Coal Company, announced late in April the appointment of **J. Craig Nelson** as export manager of the company.

Mr. Nelson, who has been identified with the tidewater and export coal trade for many years, will have headquarters at 30 Rockefeller Plaza, New York City.

Walter G. Wilhelm, who has been associated for many years with the Great Lakes coal trade, has been named assistant export manager.

Harry J. Wolf, who formerly served with various metal and non-metallic sections of the Office of Production Management, War Production Board, and Foreign Economic Administration during the war, has recently completed a two-year program of research relating to aluminum, aluminum metallurgy, and associated projects, as Research Engineer for Reynolds Metals Company at Glen Cove, N. Y. He recently returned to professional practice as mining and consulting engineer.

Loren W. Roberts, of the industrial engineering department of the Island Creek Coal Co., has been made assistant to **J. K. Berry**, head of the department.

Mr. Roberts, who has been employed by Island Creek for the past 11 years, excepting 3 years that he spent with Princess Elkhorn Coal Co., David, Ky., has served in the industrial engineering department for 2 years.

At an organization meeting of the board of American Smelting & Refining Co., **Francis H. Brownell** asked that, because of age, he be not reelected chairman of the board. Mr. Brownell remains as a director and chairman of the finance committee.

Roger W. Straus, who has been president and chairman of the executive committee, was elected chairman of the board and was reelected chairman of the executive committee.

H. Y. Walker, senior vice president, was elected president.

Kenneth C. Brownell, vice president, was elected to the newly created office of executive vice president.

Robert P. Koenig, president of Ayrshire Collieries Corp., will return shortly to the United States after completing a special mission for the State and Labor Departments of the United States in Europe and Great Britain. He represented the United States bituminous coal industry at a session of the Coal Mines Committee of the International Labor Organization at Geneva, Switzerland, April 22. While in Great Britain, Mr. Koenig was special technical consultant to the United States Ambassador to the United Kingdom, Lewis W. Douglas. His duties consisted of assisting in a survey of the coal industry in the United Kingdom. He is due back in the United States shortly after the middle of June.

Walter E. Scott, Jr. and **Harvey Tedrow** are at present associated as consulting mining engineers and are operating the Terrible - Dunderberg Mine at Silver Plume, Colo. They recently acquired the Mendota property which adjoins the Terrible - Dunderberg and hope during the summer to get this mine in operation. The Terrible - Dunderberg property has been leased from Gold Mines Consolidated and is one of the best known mines in the Silver Plume area. Throughout the war the Mendota was a steady small producer of lead-zinc-silver ore.

Walter E. Scott, Jr.

Harvey Tedrow

R. S. Long has become a vice-president of the Riverton Coal Co. at Crown Hill, W. Va. He was formerly associated with Eastern Gas & Fuel Associates, Coal Division, Mt. Hope. W. Va.

Early in May, **Eugene C. Bauer, Jr.**, was elected vice president of Kensington Steel Co., of Chicago, Ill.

E. McL. Tittmann, general manager of the El Paso Smelting Works, has been appointed chairman of the El Paso Mining Committee. This committee will sponsor the 1947 International Mining Days celebration and make arrangements for the American Mining Congress, Western Division, convention, which opens Oct. 27 and continues through Oct. 29.

J. H. Hillman, Jr., formerly president, has been elected chairman of the board of Pittsburgh Coke & Chemical Company. He has been succeeded as president by Richard M. Marshall who has been serving as executive vice-president. **G. E. Digman**, formerly works manager at Neville Island, is now vice-president in charge of operations.

— *Obituaries* —

J. O. B. Keener, superintendent of the Stratton C. C. M. & D. Co., and well known throughout the West for his activities in mining and oil, died April 18, 1947, in Colorado Springs. He would have been 70 in July. Mr. Keener was instrumental in bringing about the reopening of a great many mines in Cripple Creek, which had been inoperative for many years, and he was an early advocate of the use of geophysical means as aids in the determination of oil structures.

John Burton Thompson, prominent retired mining investment broker and prospector in Salt Lake City, died of causes incident to age May 9 in a Salt Lake hospital.

A son of J. H. and Eliza Thompson, he was born October 24, 1854, in Hillsboro, Ohio. He came West in his youth and resided for a time in Ouray, Colo., where he was employed as a bank cashier.

Coming to Salt Lake City in 1888, he established a real estate business and continued his banking interests. He engaged in this work until about 1902, when he became associated with the mining stock brokerage and Salt Lake stock exchange.

One of the original discoverers of the Old Montana Tonopah mine, Mr. Thompson also located some of the mining property in Bingham. He was one of the early stockholders in the Utah Copper Co.

H. L. Good, operating vice president of the Westmoreland Coal Co., died suddenly May 16 while returning to Irwin, Pa., by motor after attending a meeting of the Western Pennsylvania Coal Operators Association. Mr. Good was widely known and had many friends throughout the coal industry, having been identified with the industry his entire working life. He was 67 years old. Funeral services were held at Irwin, Pa., May 20.

John Atkins Payne, president of the Consolidated Coppermines Corporation, died Friday, April 18, of a heart ailment. He was 47 years of age.

Mr. Payne was elected president of Consolidated Coppermines in 1940. He was also chairman of the board of the Titan Metal Manufacturing Co., of Bellefonte, Pa., a Consolidated subsidiary, and was a director of the Liberty Aircraft Products Corporation, Farmingdale, L. I.; the Highway Trailer Co., Egerton, Wis.; the Roberts Numbering Machine Co., Brooklyn; and the Autocar Co., of Ardmore, Pa.

George E. Moffett, 83, died April 22 at the home of his granddaughter, Mrs. Connie Danley, at Alamogordo, N. Mex. He was a pioneer mining engineer, and active in the development and operation of mining properties in southern New Mexico from 1898 until he retired, 15 years ago. Mr. Moffett was a member of the New Mexico Constitutional Convention from Otero County, and in his later years served as county surveyor and probate judge of his county.

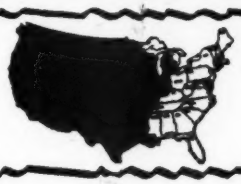
Edward J. Mathews, 81 years old, Seattle business man, died late in May. Mr. Mathews, born in Dayton, Ohio, had lived in the Seattle area and in Alaska since 1900. He owned mines in Alaska and at one time was owner of the Denny-Renton Clay & Coal Co. Mr. Mathews was formerly president of the Keewalik Mining Co. at Candle, Alaska, and president of the Fairhaven Gold Dredging Co., also in Alaska.

John Stark, superintendent of the Cresson mine at Cripple Creek, Colo., died underground when overcome by gas on April 9. Mr. Clark was attempting to rescue two men who had been exposed to gas on the 1,100-ft. level of the mine. He went to work in the ore house of the Cresson mine in 1918 and has been connected with the property ever since. In 1941 he was made mine superintendent. John Stark was one of the most popular and able mining men in the Cripple Creek district and his loss will be keenly felt in Colorado mining circles.

C. E. Addams, 67, died in Phoenix, Ariz., on May 7, following an extended illness. Born in Plymouth, Pa., Addams went to Kimberley, South Africa, in 1901, and remained there until 1913, serving with the Voorspoeld mines there, and later becoming manager of the Wesselton mines of the DeBeers Diamond Mining Co. In 1913 he went to Ray, Ariz., where he was an executive of the Ray Consolidated Copper Co., and subsequently was superintendent of the Hercules mine there. In more recent years he had devoted his efforts to highway and other construction work.

NEWS and VIEWS

Eastern States



Complete Mechanization Under Way

The New River Co., operating in Fayette and Raleigh Counties, West Virginia, is continuing its shift in the direction of complete mechanization. Substantial shipments of new conveyor units have recently been received at the company's Oakwood and Summerlee mines, located near Oak Hill in Fayette County.

The Skelton mine of the same company, located at the outskirts of Beckley, is driving a slope to the Beckley seam, 300 feet below the Sewell, from which current production is being mined.

Three New Coal Mines

S. M. Cassidy, President, Consolidation Coal Company (Ky.), with headquarters at Jenkins, Kentucky, announced early in May plans to open three new coal mines in the near future. This company, a subsidiary of the Pittsburgh Consolidation Coal Company, now operates six mines located at Van Lear, in Johnson County, Jenkins, Dunham and McRoberts in Letcher County, and at Closplint, in Harlan County.

While work on all three new operations has already been started, or will be started during 1947, a period of two years will be required to finish the installations and obtain full production. The three new plants will be the Hendrix Mine at Deane, the Wright Mine at Dunham, both in Letcher County, and the Hill Mine on Pelphrey's (or Burkes') Branch, near Myra, Pike County.

The Hendrix, named for a hero of World War II, in the No. 3 Elkhorn coal seam, will be served by both the Louisville & Nashville and Chesapeake & Ohio railroads. Its initial capacity will be 3,000 tons of coal per day. It is ultimately expected to produce 6,000 tons daily. The L&N railroad is making a 16-mile extension up Rockhouse Creek to serve this operation, while the C&O is already building a 24-mile line from Wayland on Right Beaver Creek through Beaver Gap to Deane. Cost of the L&N extension is estimated at $2,000,000 while the C&O extension will be approximately $3,500,000. Consolidation will invest approximately $2,000,000 in the new Hendrix Mine. All mining operations will be mechanized and all coal will be washed. Much of this equipment is already on order.

A second new mine will be in the No. 4 Elkhorn coal seam at Dunham on the C&O railroad and will be named for the late John Wesley Wright, known far and wide as "Uncle John," "Bad John of the Cumberlands," "Devil John" and "The Tall Sycamore of the Elkhorn." The Wright Mine will start on coal production this year and will ultimately produce 3,000 tons daily. Its output will be washed on a separate shift at the existing Central Preparation Plant.

The third new operation will be known as Hill Mine, named for the late Robert C. Hill, first Chairman of the Board of the Pittsburgh Consolidation Coal Company and for many years prior to the merger in the same capacity with the former Consolidation Coal Company. Hill Mine is due to start production this year in the No. 3 Elkhorn coal with an ultimate output of 1,500 tons daily. An extension of one mile by the C&O railroad will be needed to serve its new tipple.

Installation of these three mines is not to increase production of the company as a whole, but mainly to replace tonnage that will shortly be lost due to gradual working out of the present Consol Mines Nos. 204, 206, 207 and 214. Of these, Mine 206 will finish this year.

All of the three new mines will have the very latest types of machinery and will be planned for the safest possible working conditions. Bathhouses and other facilities for the employes are so planned as to set new standards for the district. No houses will be built by the coal company as good roads in all three cases make the mines readily accessible from surrounding towns.

New Slope Being Driven

The Kelly's Creek Collieries, at Ward in Kanawha Co., W. Va., is driving a slope at the site of the No. 2 mine tipple, down to the No. 2 Gas seam. Present production at this plant is from the Lewiston and Winifrede seams, which are approaching depletion. Preliminary production from the No. 2 Gas will be loaded run-of-mine in order to avoid blending the two grades of coal. An additional track will be laid under the tipple to accommodate the No. 2 Gas coal. Belt haulage will be installed from the coal level up the slope to the No. 2 tipple and the mine's entire production will eventually come from the No. 2 Gas seam.

More Federal Inspectors

The House Appropriations Committee has granted $1,625,000 for coal mine inspection and investigation and $1,148,000 for investigating mine accidents and operating mine rescue cars. The items were contained in the fiscal 1948 appropriations bill for the Interior Department.

The figures for these two categories represented increases of $100,000 and $103,500, respectively, over the funds granted for the same purposes for fiscal year 1947. All told, the funds if appropriated will provide for a total of 202 mine inspectors as against 171 now employed.

Annual Meeting

The Annual Meeting of the Mineral Producers Association will be held in the William Penn Hotel, Pittsburgh, Pa., on the afternoon and evening of June 27.

New Mine Rescue Truck

A new mine rescue truck that will protect lives and property in the coal mining industry was delivered at Pittsburgh during April to the Honorable Richard Maize, Secretary of Mines, and W. Garfield Thomas, Deputy Secretary of Mines, for the Commonwealth of Pennsylvania. The first of three that are on order, this new truck will be used both for training and for actual assistance at mine disasters. It is equipped with oxygen breathing apparatus, gas masks, protective hats, electric cap lamps, gas detecting instruments, first aid materials, stretcher, blankets and an inhalator. And there are facilities for the complete servicing of this equipment. This truck is, in fact, a complete mine rescue station on wheels.

Trained rescue crews equipped with modern apparatus can do a great deal toward reducing the cost in lives and in property damage at a mine explosion. But, to be most effective, they must reach the scene of the disaster quickly. An important purpose of the new Pennsylvania mine rescue trucks will be to speed help whenever disaster strikes.

The plans are to locate the three trucks centrally in the coal regions of the state: one truck in Uniontown, one in Ebensburg, and the third in the hard coal region, in Wilkes-Barre. Each truck will be operated by two men, both experts in mine rescue and first aid work. These men will spend most of their time in training mine rescue crews at the various mines in their territory. But in case of an emergency, the truck can be driven at once to the affected mine picking up crews on the way.

Research Problems Discussed

Addressing the Central West Virginia Coal Mining Institute at Clarksburg, W. Va., on May 23, T. A. Day, special representative of Bituminous Coal Research, Inc., of Pittsburgh, spoke on the subject of "Bituminous Coal Industry Calls on Science and Technology." He told how additional and broader uses of coal are being found by BCR's research program. Approximately 125 persons attended the meeting which was held in the Waldo Hotel. The next meeting is to be held June 19 at the Masonic Temple at Fairmont, W. Va. The program will be in charge of Mine Safety Appliances Company, who will present two films on "Coal Dust Explosions" and "The Use of Rock Dust and Water Combination for Fighting Coal Fires."

Honors for Heroism

Heroic action in risking their lives to save others and extraordinary courage in emergencies have been recognized by the Joseph A. Holmes Safety Association in the awarding of medals and diplomas to 11 individuals in the mineral and allied industries of the United States, it was announced May 23 by Dr. R. R. Sayers, Director of the Bureau of Mines, and the president of the association. Nine of the individuals are to receive medals and diplomas or citations of their action, while two are to receive diplomas.

For outstanding safety performance records or much better-than-average success in supervisory work, the Association also presented Certificates of Honor to 110 coal mining, metal mining, nonmetallic mining, and petroleum companies, and to 13 individuals.

Meeting in Washington, D. C., on May 20, for the presentation of awards for the second time since the end of the war, the Association this year voted a special award for an outstanding record of safety promotion over a long period of time by an individual. A similar citation was made last year when annual meetings were resumed after a five-year lapse due to the war. This year's special award will be presented to A. J. R. Curtis, Safety Director for the Portland Cement Association, Chicago, Ill., for an outstanding leadership in the field of safety during the past 25 years.

Composed of 29 leading national organizations, representing the mining, metallurgical, and allied industries, and various safety groups, the Joseph A. Holmes Association was founded to commemorate the efforts of Dr. Joseph Austin Holmes, first director of the Bureau of Mines in the forwarding of safety in the mining industry. Since its formation in 1916 to honor this pioneer in accident reduction and improved health conditions in the mineral and related industries, the Association has considered thousands of cases for awards of medals and certificates. By careful screening of applications and consideration of the merits of each case, the awards have become among the most coveted made for safety achievements in the mineral industries.

The 1947 awards were made by the Council of the Association following the annual meeting of the Board of Directors in the office of Dr. Sayers in Washington. Attending this meeting at which various reports from officers were presented, were President Sayers; A. W. Dickinson of the American Mining Congress; J. D. Conover, American Mining Congress; Dr. A. C. Fieldner, chief of the Fuels and Explosives Branch of the Bureau, representing the American Society for Testing Materials; Dr. J. J. Rutledge, Chief Mine Engineer for the State of Maryland Board of Natural Resources, representing the Geological Society of America and the Mine Inspectors' Institute of America; Harry Gandy, Jr., Executive Representative of the National Coal Association; Daniel Harrington, chief of the Health and Safety Branch of the Bureau and secretary of the Association, and J. J. Forbes, chief of the Coal Mine Inspection Division of the Bureau and secretary of the Holmes Safety Association, an adjunct of the main body.

Additional member organizations represented at the general council meeting following the directors' meeting were S. H. Ash, Bureau of Mines representing the American Institute of Mining and Metallurgical Engineers; P. D. McMurrer, American Mining Congress; George A. Taylor, American Chemical Society; O. C. Ralston, Bureau of Mines representing the American Ceramic Society; Harrison Combs, United Mine Workers of America; A. D. Lewis, American Federation of Labor; Fred C. Reed, Smithsonian Institute; George W. Vinal, National Bureau of Standards, representing the Electrochemical Society of America; J. F. Barkley, Bureau of Mines representing the American Society of Mechanical Engineers; Wilbert J. Huff, representing the American Gas Association; Richard W. Thrush, American National Red Cross; J. G. Townsend, United States Public Health Service; Lloyd A. Blanchard, National Safety Council; and G. B. Curtis, Railway Fuel and Traveling Engineers Association.

During the meeting of the council representatives, special tribute was paid to Mr. Harrington, under whose guidance as Secretary for the past two decades hundreds of awards have

been made by the Association. Mr. Harrington was again elected to the position as secretary of the organization.

Among the medalists in this year's list of those who risked their own lives to save another was Dr. B. S. Clements, a mine physician practicing at Matoaka not far from Bluefield, W. Va., whose undaunted courage and work under extremely adverse conditions undoubtedly saved the life of a miner trapped with a badly mangled left leg in the Crane Creek Mine No. 6 of the American Coal Company, at McComas, W. Va., (nearly three years ago).

Called to the mine where William Sperry was held prisoner underground by a mining machine, Dr. Clements, in spite of his 62 years of age and 6-foot, 7-inch height, crawled more than 300 feet through a 36-inch coal seam to reach the victim. Because extrication of the man would have resulted in further, and perhaps, fatal injury, Dr. Clements decided an amputation on the scene. Assisted by the general superintendent and later by another doctor, Dr. Clements successfully amputated the leg and directed Sperry's removal to the Bluefield Sanitarium where Sperry subsequently recovered.

Total Mechanization Planned

The Hatfield-Campbell Creek Coal Co., operating on Campbell's Creek in Kanawha County, West Virginia, plans eventual 100 per cent mechanical production at the Point Lick Mine. This plant produces about 2,000 tons per day, most of which is at present hand-loaded. Delivery was received around January first of a new loading machine, a pneumatic-mounted cutting machine and Joy shuttle-buggies. The proposed future mechanization will follow this pattern, the experimental unit having proved satisfactory. A cleaning plant is also planned, but no details of this unit are as yet available.

New Conveyor Installation

Tennessee Coal, Iron and Railroad Co., a United States Steel subsidiary, recently announced plans for the installation of a new conveyor belt which will raise 600 tons of coal an hour to a height of 715 ft. This will be located at the new Concord mine near Birmingham, Alabama, and it is believed to be the greatest height ever attempted with conveyor belt operations. The belt will be delivered to the mine in five sections and will weigh 42 tons. It will be assembled on the ground and operations are scheduled to begin in the latter part of this year.

Research Program Continues

The bituminous coal industry has announced that it is making plans for "conducting research into new mining methods," with a view to reducing production costs. This announcement was made during a special meeting held at Pittsburgh recently under the auspices of Bituminous Coal Research, Inc.

The program contemplates raising a special fund to finance a new research activity of the industry, naming a Mining Development Committee of top level executives representing the sponsors, and consulting with mining machinery companies as the development plans are being formulated.

"The entire object," said Howard N. Eavenson, president of the BCR agency, "will be to develop the best methods for mining coal cheaply just as rapidly as can be done."

New Shaft Planned

The Mathieson Alkali Works of Saltville, Va., have awarded a contract to the Worden-Allen Co. of Milwaukee to fabricate a steel headframe and bins for a new shaft which will be an outlet for limestone. Contracts for construction of a new mine hoist and shaft have also been let. The firm uses limestone in the manufacture of soda ash, caustic soda, dry ice and bicarbonate of soda.

Central States

Court Judgment on Sink-Float Suit

American Zinc, Lead & Smelting Company announced May 19 that the United States Circuit Court of Appeals at Kansas City, Missouri, had affirmed the judgment of the United States District Court at Jolpin, Missouri, which was rendered in favor of American Zinc, Lead & Smelting Company and its associated corporation, Minerals Beneficiation Incorporated, in a suit filed against these two companies by Charles B. Hebbard, formerly of Joplin. The suit involved the claim of Mr. Hebbard that he had invented a very valuable method of ore separation based upon the principle of sink and float while employed by the defendant companies under a contract by which he was to be paid the fair value of any commercially valuable invention he might make while in the employment of the companies. The defendant companies contended that Mr. Hebbard's employment contract gave the companies title to any invention he made or contributed to and that there was no basis for his contention that he had not been fully paid everything coming to him under the contract.

In a trial at Joplin, Missouri, which took several days to complete, the District Judge found all points in favor of the defendant companies and dismissed the action. From this judgment of the court, the plaintiff appealed to the United States Circuit Court of Appeals at Kansas City, which Court has just affirmed the action of the trial court.

The process of separating ores involved in the lawsuit, in which the invention of Mr. Hebbard was a minor part, was developed in 1936 at the Mascot, Tennessee, operations of the American Zinc Company, where the first successful sink and float separation of metallic ores was demonstrated by the H. M. S. Process.

In the interim, in addition to treating more than a million tons of material a year at Mascot, the process has been licensed throughout the United States and some foreign countries for the treatment of zinc, iron, lead, tin, fluorspar, magnesite, garnet, and recently licenses have been negotiated with several of the largest bituminous coal operators in the United States.

Mine Being Reopened

H. A. Williams and Gilbert Fenix of Oronogo have taken a lease on the old Mattes mine from George W. Potter of Joplin, Missouri.

The mine shaft has been dewatered to a depth of about 160 feet, where cleanup operations will be initiated, by means of an eight-inch turbine pump. The old shaft has been repaired and a derrick has been built over it, with the necessary hoisting equipment installed for dumping on the surface. Ore will be trucked to the C., G. & C. Northside mill, northwest of Chitwood, for treatment. Plans have been made to make the cleanup with Diesel-powered dozer, with loading by air shovel.

Potter recently acquired the entire Missouri holdings of the C., G. & C. Company, which operates a tailing plant and mines in Oklahoma. Charles A. Neal, Sr., and G. C. Niday, both of Miami, have retained their interests with Potter in the Oklahoma properties.

Reclamation Planting Continues

Completion of the 1947 installment of Indiana's largest tree-planting program was announced recently by L. E. Sawyer, on behalf of open cut mine owners who planted more than two and one-half million trees on nearly 3,000 acres of land. The trees represented about one-third the total output of the Indiana State nurseries, which this year for the first time were able to supply all of the stock needed by the mines. Mine owners purchase the stock from the state and bear all the planting expense.

Sawyer, who is director of the division of forestry and reclamation of the Indiana Coal Producers Association, said the planting season was delayed about one month because of unfavorable weather. First trees were planted in Warrick County and the work progressed northward as the season advanced, the last plantings being made in Clay and Vigo Counties. Enlarging of planting crews and speedup in deliveries enabled the mine owners to complete the work only slightly behind the original schedule.

All plantings are being inspected by Jack Winchell, of Linton, District Forester of the Division of Forestry of the Indiana Department of Conservation, who had approved the planting sites after soil tests were made by a number of agencies, including soil experts from Purdue University and the Federal Central States Forest Experiment Station.

This year's program brought the total of trees planted by Indiana open cut mine owners over the 21-million mark. The scientifically-planned program was instituted in 1940 following a score of years of experimental planting.

Mine Suspends Operations

The Mary Charlotte iron mine at Negaunee, Mich., has stopped all mining operations. On May first the mine was taken over from the North Range Mining Co. by the Inter-State Iron Co. The North Range Co. will remove its supplies but all buildings and equipment will be turned over

to the new owners. Until recently about 130 men were employed at the Mary Charlotte and some of the older workers are being transferred to the Blueberry mine near Ishpeming. It is understood that the Inter-State Iron Co. has no plans at this time for the Negaunee property.

Outlook Excellent for Iron Company

The Cleveland-Cliffs Iron Company's management believes the company's outlook is brighter today than at any time since 1929, Board Chairman Edward B. Greene said May 6 in a talk delivered in Cleveland, Ohio.

The diversified lines of business in which Cleveland-Cliffs is engaged and its large reserves of unmined iron ore were cited by Mr. Greene as among the reasons why the 97-year-old company is looking confidently toward the future.

"The founders of our company did not go out to build up a collection of unrelated interests," Mr. Greene said. "They were pioneers, starting from scratch in the virgin wilderness of Michigan's Upper Peninsula, and having to develop what they needed to establish the iron ore industry. Our interests in timber lands, railroads, hydro-electric plants and chemical plants, as well as in mines, docks, vessels and reserve ore properties, were acquired along that pattern."

Cleveland-Cliffs is now operating or managing 16 iron ore mines on the Mesaba and Marquette ranges in Minnesota and Michigan. Shipments of ore from Cleveland-Cliffs mines, plus shipments of ore purchased and resold by the company, last year represented 12 per cent of the total shipped from the Lake Superior district. Research in the beneficiation of low-grade iron ores is advancing rapidly through studies now being conducted by universities, research organizations and iron ore companies. This progress, and the rapid rate of consumption of the highest grade deposits, indicates that the opening of new mines in the lower-grade reserve properties can be looked for in the near future.

"This year and last vessel owners received rate increases for shipping ore and coal over the lakes, although the increases have not been proportionate to the increases in vessel operating costs," said Mr. Greene. "The Great Lakes vessel industry remains by long odds the lowest-cost bulk transportation system in the history of the world."

The fleet of 22 vessels operated by Cleveland-Cliffs in 1946 carried a total of 7,281,111 gross tons of iron ore and coal, of which 5,162,325 tons were iron ore. Other operations in 1946 included 4,250,576 tons of coal sold, 72,162,234 feet of lumber cut, and 88,018,054 k.w.h. of electricity sold.

Meeting Canceled

The Illinois Mining Institute was obliged to cancel its 27th Annual Boat Trip and summer meeting scheduled for June 6. B. E. Schonthal, secretary-treasurer of the Institute, announced that the steamer "Golden Eagle" had the misfortune of having its bottom punctured and, since it is out of commission for the remainder of the season, the boat trip cannot be held this year.

Operations in the "Little Tri-State" District

Operations are continuing in the Wisconsin-Illinois-Iowa zinc and lead district. Present production is approximately 1,200 tons of zinc metal per month, still obtained in considerable part from the robbing of old mines by small operators. Few of these operators mill their own ore, most of which is shipped to the custom mill at Cuba City owned by the Cuba Mining Co., a subsidiary of Youngstown Sheet and Tube Co. Vinegar Hill Zinc Co. and the Cuba Mining Co. have until recently been the only large operators in the district since the withdrawal of New Jersey Zinc Co. in the middle of 1920.

The first of the larger companies to re-enter the district was Tri-State Zinc Co. who took over the Gray-Bautsch ore bodies 5 miles south of Galena, Ill., in 1944. These ore bodies had been drilled by the U. S. Bureau of Mines in 1943 and 1944 and about one million tons of ore were blocked out at that time. At present the Gray ore body is about one-third mined out and the Bautsch (a larger and much richer ore body) is still in the development stage. These properties have a flotation mill and produce approximately 400 tons of metallic zinc per month.

In the spring of 1946 Eagle-Picher Mining and Smelting Co. entered the district and leased a block of several thousand acres north of Galena below the Wisconsin line. About ten churn drills have been operating on this block since that time. A 660-ft. grid was used for prospecting the area and although ore might be missed by this wide spacing, the geology and structure can be obtained in sufficient detail to enable selection of the most favorable area for more detailed work. To date Eagle-Picher has discovered two new ore bodies, one at least of large size.

During the early part of 1947, Calumet & Hecla Consolidated Copper Co. set up a separate corporation for zinc mining known as the Calumet Corporation. Calumet has leased a large block of ground around Shullsburg, Wis., and at present has four churn drills operating with the prospect of

at least four more within 60 days. Some diamond drilling is also contemplated, mainly to check any ore bodies located by churn drilling. Calumet also has leases a few miles south of Platteville on the extension of the old Blockhouse Range. Preliminary drilling is being conducted in the same fashion as that of Eagle-Picher, except that 660-ft. cross-sections are being drilled 1,320 ft. apart in areas where the geology is not known. This interval is shortened considerably in areas adjacent to ore bodies where the trend has been established.

About the same time that Calumet became interested in this district, St. Joseph Lead Co. acquired leases in the Fairplay area about 20 miles southwest of Platteville, Wis. Additional leases were also secured in the Tennyson area, about 12 miles west of Platteville but as yet drilling operations have not started.

It is understood that American Metal is also conducting a prospecting program in this area and since the first of April has been engaged in acquiring leases in the vicinity of Elizabeth, Ill. As yet drilling operations have not started on American Metal ground.

Taconite Plant to Be Erected

The Erie Mining Co. at Aurora, Minn., is planning to erect a test plant for the production of iron concentrates from taconite. Ground is to be broken for this project not later than July first and the plant will be in operation on a commercial scale by the middle of next year. Contracts have already been awarded for the erection of all structural steel. The Erie Mining Co. is a subsidiary of Pickands Mather & Co.

Locomotive Storage House to Be Built

The Oliver Iron Mining Co. is planning to begin construction of an $80,000 diesel locomotive storage house on the Mesabi Range at Hibbing, Minn. So much additional equipment has been purchased by the company that this storage house is badly needed. The company is also planning to erect a large truck and tractor garage at Virginia, Minn.

Stockpile Trestle to Be Extended

Contracts have been awarded by the Cleveland-Cliffs Iron Co. at Ishpeming, Michigan, to extend its Mather mine permanent stockpile trestle to a length of 625 ft. Specifications call for centers of 125 ft. between reinforced concrete columns and provide for a height of approximately 60 ft. for the stockpiles.

Safety Meeting at Duluth

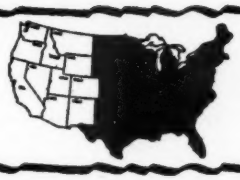
The 23rd Annual Mine Safety Conference of the Lake Superior Mining Section of the National Safety Council will be held this year at Duluth, Thursday and Friday, June 19 and 20. The banquet and all meetings will take place in the Hotel Duluth.

Bryon G. Best, supervisor of safety for the Oliver Iron Mining Co. is general chairman of the event. Last year the attendance totaled over 600 and it is anticipated that even a larger number will be present this year.

Test Drilling on Mesabi

According from a report from Hibbing, Minn., exploratory and test drilling is being done on the Burrall Reserve within the town limits of Hibbing. This may mean eventually that another stripping operation will be located in this area. The property is under development by Butler Bros. who operate the Weggum mine nearby. No shipments have been made from the property but according to the mining directory of Minnesota, the mine has available ore tonnages of 1,533,411.

Western States



Reopening of Old Property

Peacock Mines Inc. will shortly resume operations on its Magnet and Hatta claims in the Dunkelberg district of Granite County, Montana, according to E. C. Ecklesdafer of Drummond, vice president of the company. The properties are located 16 miles south of Drummond and have not been operated since 1906. They were closed at that time due to metallurgical difficulties in separating lead from zinc. A power line is being built from the Forest Rose mine and modern machinery is being installed. A 400-foot incline shaft is being reopened.

Development Tunnel Progressing

Theodore W. Carter, mining engineer associated with the Bradley Mining Company of San Francisco in development of gold-silver properties at Mogollon, Catron County, New Mexico, reports that work is making steady progress. A tunnel being driven to open new ore bodies has reached 3,000 feet. At this rate, production is expected to start by the end of the year.

Geological Surveys Planned

The New Mexico Bureau of Mines and Mineral Resources at Socorro is planning two extensive new geological surveys made possible by a special appropriation by the state legislature, according to E. C. Anderson, director. Funds will become available July 1, when a ground water survey will start, and later a basic geological survey of the "hard rock" districts of the state will begin. Assisting in plans for these two surveys is Dr. Charles F. Park, a graduate of the New Mexico School of Mines (1926), formerly chief of the Metals Division of the U. S. Geological Survey, and at present Professor of Geology at Stanford University.

Jumbo for Shaft Work

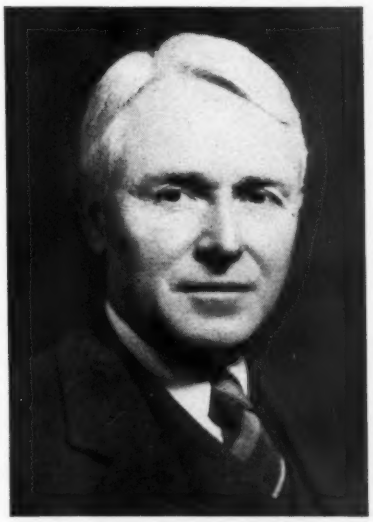
Ralph Neyman, general mine superintendent for the Hecla Mining Company, has invented and assembled a new jumbo drilling rig for shaft work, believed to be the first application of this principle to shaft sinking. The rig has been in service at the Star mine for several months and is reported to have reduced the drilling time by 10 per cent.

Copper Claims on Navajo Reservation

The Lewin-Mathes Company of St. Louis, Missouri, and Monsanto, Illinois, has acquired a group of 28 mining claims in the White Mesa mining area, 110 miles north of Flagstaff, near The Gap, Arizona, and is starting an extensive drilling program on the property. As soon thereafter as possible, a $500,000 processing plant will be constructed. In addition to the mining claims, the Lewin-Mathes interests also acquired the exclusive rights to a new-type milling process, developed by the Mardum Company.

Negotiations for the leasing of the claims were begun last February and consummation of the deal came when the claim owners, E. G. Archer and K. E. Anderson, both of Los Angeles, and Claude F. Thompson of The Gap, assigned lease rights with option to purchase to the Lewin-Mathes Company. It is claimed that recovery of the copper values has been made possible through the development of the Mardun process of dry concentration. By this process the ore first passes to special crushers for disintegration, then to a direct-fired rotary drier and from there to an adjustable grinder. Discharge from the grinder goes to a special air separator which removes the copper values. Pilot plant experience is said to have indicated that heads averaging 2 per cent will produce a 20 per cent concentrate with a recovery of 90 per cent, while an 0.8 per cent head produces a 10 per cent concentrate. The deposit will be mined by open-pit methods.

Donald McLaughlin Heads Program Committee for El Paso Meeting of Mining Congress



DONALD H. McLAUGHLIN, President of Homestake Mining Company, of San Francisco, has accepted the National Chairmanship of the Program Committee for the 1947 Metal Mining Convention of the American Mining Congress, to be held at El Paso, Texas, October 27-29.

An industry-wide committee is being appointed to work with Mr. McLaughlin in developing a program that will center upon the major economic, legislative and operating problems of the metal and non-metallic industries. With the expositions of mining machinery now held in alternate years, there will be no equipment exhibits at El Paso, and the full three days will be devoted to convention sessions. Entertainment plans are being made by the Mining Committee of the El Paso Chamber of Commerce, headed by E. McL. Tittman, and El Paso's renowned International Mining Days celebration will be combined with the Mining Congress meeting.

The Convention is sponsored by the Western Division of the American Mining Congress, headed by H. M. Lavender, Vice President, Phelps Dodge Corp., Douglas, Ariz. An attendance of 1500 is anticipated, and immediate requests for hotel reservations should be sent to J. J. Shores, Secretary, Mining Committee, El Paso Chamber of Commerce.

Perlite Mine in Production

Dant and Russell, Inc., perlite division, is now processing perlite mined from the Lady Frances mine on the Deschutes River, southern Wasco County, Oregon. The material is crushed and sized at the mine and then shipped to the furnace plant at St. Helens on the Columbia River, north of Portland. Two commercial products are being marketed—a superior plaster sand which weighs about 12 pounds per cubic foot, and an acoustical plaster made up essentially of perlite plus a binder. Both products possess many advantages in building construction, and represent a forward step in building technique.

Production on Comstock Lode

Production of gold and silver is gradually increasing on the Comstock Lode. Most of the men employed are veteran Virginia City, Nevada, miners and present activities are largely restricted to mining of surface deposits. Resumption of underground operations is planned by several companies when the manpower situation becomes more satisfactory.

Cons. Chollar Gould & Savage Mining Co. is milling approximately 500 tons of gold-silver ore daily and is the leading Comstock Lode gold producer. A surface deposit is mined in open pits with two power shovels at Gold Hill. The company was Nevada's largest lode gold producer in 1946.

Reconditioning of its properties for major operation is being carried forward by Dayton Cons. Mines Co. Diamond drilling is proceeding in virgin territory with the purpose of extending known ore bearing areas. Development work on the 600 and 700 foot levels of the New York shaft has disclosed good milling ore. The cyanide mill at Silver City will be operated at approximate capacity as soon as sufficient ore has been blocked out.

A New Idaho Producer

Lucky Friday Silver-Lead Mining Company, in the Coeur d'Alene district of Idaho, will hereafter be in the producing mine class with steady shipments to the Golconda custom mill, according to John Sekulic, general manager. Up to date the company has received in excess of $229,000 for ore mined during prospect work down to the 1,400 level. Only enough ore was shipped to pay for equipment and mining costs to gain deeper levels Stoping will now be undertaken from the 1,400 as far up as it proves profitable. In drifting on the vein and preparing a stope length of 450 ft. the company has produced around 2,500 tons of ore which is now ready for milling.

New Technique in Labor Disputes

News from the gold camp of Grass Valley, Calif., indicates a new method of cooperative settlement of disputes between worker and management.

The manager of the Idaho Maryland Mines Corp. discharged a miner for alleged "high grading" and the mine union, faced with the refusal of the management to reinstate the discharged miner, called the miners out of the New Brunswick mine.

Representatives of the Mother Lode Mine, Mill and Smelter Workers union met with the management to discuss the reinstatement matter. Long discussion came to naught. Then the manager, Neil O'Donnell, suggested that a coin be tossed to de-

cide the issue. A 50c coin was tossed —O'Donnell won the toss—the men went back to work the next day, May 9, 1947, after one day's idleness.

Concentrates Shipped

The Cedar Talisman Consolidated Mines Company, operating the French-Lily mine in Yavapai County, Arizona, near Cleator, has made two shipments of concentrates, the lead going to the El Paso smelter and the zinc to the Amarillo smelter. Cedar Talisman acquired the French Lily a year and one-half ago and since then has retimbered the 400-foot inclined shaft, done considerable development work, and erected a flotation plant with a daily capacity of 65 tons. J. Walters, Jr., 119 North Montezuma Street, Prescott, Arizona, is president of the company and is directing operations.

Denn Shaft Reconditioning

Reconditioning of the Denn shaft of the old Shattuck Denn Mining Corporation, Bisbee, Arizona, has been started by Phelps Dodge Corporation. This part of the Shattuck Denn property was purchased by Phelps Dodge this spring. In the near future it is proposed that all copper ore from this section of Phelps Dodge holdings will be hoisted through the Denn shaft, while the Campbell shaft will be used for hoisting lead production.

New Dredging Project

Incorporation in California of Gold Ventures, Ltd. has been the signal for undertaking a dredging project along the productive Klamath river in Siskiyou County, Calif. A dragline dredge with washing plant is to be moved at once to the property from near Bridgeport by Wells Cargo Inc. of Reno.

Development and intensive test work, conducted during the past year on the large alluvial tracts acquired, was said to indicate at least a seven-year supply of profitable gravel on the main property with additional resources on other holdings. On the main tract, known as the Portuguese, test sampling of gravel was said to have given assay returns of 60 cents per cubic yard.

Pioche Mill Enlarged

E. H. Snyder, president of the Combined Metals Reduction Co., reports that seven flotation cells and other units are being added to equipment

of the Caselton selective-flotation mill near Pioche, Nevada. With its two complete circuits and with projected changes in the screening and grinding, capacity of the plant will be increased from the current 1,000 tons to 1,500 tons per day.

Gold-Tungsten Ore to Be Milled

Milling of gold-tungsten ore will be started by the Alps Mining & Milling Co. H. H. Miller of Missoula, Montana, is president of the company. Forty claims are held in the Harvey Creek mining district and Frank A. Hancock of Missoula is resident engineer.

Sulphur from Geyser Basin

Sulphur is mined near Cody, Wyo., by tractor and scraper

On the floor of an extinct geyser basin three miles west of Cody, Wyoming, lie tons of valuable sulphur now being mined by the F. A. Sheridan Construction Co., of Billings, Montana.

Indian legends relate that the area west of Cody was once the largest geyser basin in North America, and at one time featured active geysers which far surpassed Yellowstone National Park's famous "Old Faithful." When the Cody basin became extinct, the surface of the ground was left covered with a four to six foot layer of geysersite or solid rock. Below this for a distance 15 to 20 ft. is a layer of gypsum and sulphur mixed. Reliable sources report that this sulphur often appears as a free sulphur, resembling sand or limestone in hardness. Beneath this sulphur vein which varies from 500 to 1,000 feet thick, is 80 per cent pure sulphur which has been contracted to the Du-Pont Company for $68 per ton.

A new HD-14 Allis-Chalmers torque converter tractor, a Gar Wood 15 yd. scraper and HD-10 crawler started mining operations early in March on this job covering an area approximately a half mile wide and three miles long. After removing the

6 ft. geysersite layer of solid rock, loading of gypsum and sulphur begins. The sulphur content in this particular layer runs approximately 20 per cent and along with the gypsum has a value of about $12 per ton.

Unexpected Gold Pocket

An excellent strike has been made by Champion Mines Co. of Denver on their WPH lease at Cripple Creek, Colorado. The new discovery was made in a raise from the 324 foot level. The muck pile gave grab samples assaying five ounces gold to the ton and a sample from a streak of ore shows 21.90 ounces gold to the ton.

The last car shipped before this new rich strike was settled for at the rate of $18.90 per ton. Shipments totaling 117 tons averaged $17.72 per ton.

Four-Foot Vein Encountered

The new main shaft being sunk at the Crystal Hill property in the Enterprise district near Oroville, California, has opened a ledge of gold ore four feet in width which averages $15 a ton. At present, Russell Twisleton of Oroville, owner, is operating a 16-ton Straub plant on the property that includes a primary crusher, ball mill, amalgamation plates, and concentrator.

New Lease in Tintic District

A 25-year lease of its claims of the Little May Mining Co. in Ruby Gulch, in the southern part of the Tintic district in Utah, has been given to James F. Collins and Louis Z. Johnson of California. This lease was then transferred to the Tintic Metals Corp., a Nevada corporation of which Collins is president and general manager, and Johnson is vice president in charge of operations. Another 25-year lease was given to the California men on the Little May-Milford-Lilly group of claims in the Star mining district of Beaver County.

New Grinding Unit Completed

The Mountain King mine near Hobson, California, operated by Stewart & Nuss, has completed its primary grinding unit and milling operations have started. Approximately 600 tons daily are run through the mill. Ore is mined by power shovels and trucked to the crusher. Thomas B. Rice is superintendent in charge of a 30-man crew.

Highland Mary Resumes Operations

The Highland Mary Mines Inc., at Silverton, Colorado, started work recently after the county road crew had cleared the road from the Pride workings to the mill. A crew is busy working on the mill and it is expected that the company will start shipping concentrates shortly after the mill starts turning.

The Highland Mary closes during the winter months because of unusually heavy snow conditions at the head of Cunningham Gulch. It produces a good grade of ore and its contribution to the community is noticeable. Between 35 and 50 men will probably be employed at the operation when production gets at a peak.

Shaft Being Dewatered

The Callahan Zinc Lead Co. is unwatering the shaft and 500 foot drift at Mineral Park, Mt. Bross, Alma, Colo. The property involved is a large one consisting of 20 claims in the Weber group and 30 Alma Syndicate claims. The property is controlled by Norton P. Otis of Denver, and is said to contain a large undeveloped lead ore body.

New Washing Plant Installed

Installation of a dragline and washing plant near Lovelock, Nevada, is being completed in the Rosebud placer district by Adaven Mining Co. of Austin, Minn. The company leased 960 acres last year from Rosebud Mining Co. and the washing plant is designed to handle 300 cubic yards of material an hour.

Ore Dump Being Milled

Forty tons of the Bonanza King ore dump near Lovelock, Nevada, were put through the mill of the Mountlock Development Corp., on a trial run recently. Values were reported to be around $10 a ton and the mill equipment was put in working order. Plans are now being made to work the 2,500 tons of ore on the dump in the 10-stamp mill that was recently installed. It has a capacity of 25 tons a day.

New Mine in San Juan

Silver Shield Mining Company recently closed a lease and sale agreement with Geo. Mulvey for claims in the Terrible and Humboldt groups near Ouray, Colorado, and will erect a 200-ton mill and drive a tunnel from the Nevada Basin, tapping one of the rich areas in this section of the San Juans.

The mill is a new one recently erected at Hawthorne, Nev., and will be moved to Ouray. The company plans, in addition to driving the tunnel, to mill the Virginius and other dumps in that territory.

The road to the properties has been opened and miners will be moved in immediately. The Nevada mill will be moved to the site at once and it is expected to have it ready for operation by the middle of the summer. The work on the dumps will then be started and carried on while the tunnel is being driven.

Work Started at Zinc Property

Actual work has been started by Operations, Inc., on its new zinc mining and milling enterprise in Cochise County, Arizona. Early in April the company began pouring concrete for its 100-ton flotation mill at Tombstone and at the same time began to build an access road 2.8 miles long to connect its zinc prospect in the Dragoon Mountains with the road leading through Middle March Pass.

Principal figures in the new company are Francis Frederick of Berkeley, Calif., president; George I. Barnett, also of Berkeley, vice president and general manager, who will be stationed in Tombstone as resident manager of the properties; Glenn Acton of Dallas, Tex., secretary-treasurer; and Gerald Mann and his brother, Guy Mann, of Dallas, two of the incorporators. Gerald Mann, a former attorney general of Texas, has been engaged in oil operations for a number of years.

The zinc properties acquired by the company under lease and bond have been held for a number of years by Jonathan Gordon of Tombstone. They are located just back of Sheepshead, to the left of Middle March Pass, approximately 12 miles northeast of Tombstone. The prospect has never been mined on a commercial scale. Contract for the road was awarded to Paul Chadwick of Tombstone. The cost is estimated at $20,000.

Erection of the mill building and installation of equipment will be handled by the M. and S. Engineering Company, Inc., with Art Sutton of San Francisco as construction engineer in charge of the work. It will be located alongside the Southern Pacific tracks in Tombstone, adjacent to the Abril loading ramp used by the Shattuck Denn mining interests.

The company's operating schedule, calls for three shifts at the mill, with eight men to the shift.

Fifty-Ton Mill Completed

The 50-ton mill which has been under construction by the Re-organized Silver Divide Mining Co. on the New Pass property about 27 miles northwest of Austin, Nevada, is rapidly nearing completion. The plant was expected to go into production during May. While mill construction was under way, mine development continued and it is reported that there is enough ore in sight now to run the plant indefinitely.

Wheels of Government

(*Continued from page* 51)

budget and cut taxes." Dr. Harold J. Rose, vice president of Bituminous Coal Research, Inc., quoted from a 1942 report of the U. S. Public Health Service, stating that an initial plant investment of $240,000,000 and annual operating costs of about $130,000,000 would be required to treat all acid mine drainage in Pennsylvania, Maryland, Ohio and about half of West Virginia. He said these costs would be nearly 50 per cent higher as of today and would amount to better than 60 cents per ton on coal produced in this area.

At Chairman Malone's request, Sam Williston, a representative of the American Mining Congress from Oregon, appeared and advocated placing more responsibility on the States and less final authority in the Surgeon General. Williston said that in Oregon the State has Commissions which have reached very satisfactory agreements with the operators of the mines and that there has been no material trouble. He also told the committee that it might be advisable to make surveys, studies and other aids effective upon the invitation of the State, "in other words, if the State feels that it needs that help, let it ask for it."

On the final day of the hearings Senator Barkley (Dem., Ky.), co-sponsor of the bill, suggested that the committee give due consideration to the protests of the mining and other industrial witnesses and confessed that he did not have the answer to write legislation giving injunctive powers to the Federal Government without jeopardizing industry in the manner pointed out by mining representatives. Barkley said, "I cannot reach into a hat and pull out a legislative rabbit, to solve that problem, and I would not be frank if I did not say to the committee that I do not know exactly what the last word is on that."

The House Committee on Public Works will open hearings on the Water Pollution bills by Representatives Spence (Dem., Ky.) and Mundt (Rep., S. Dak.), on June 11. The Mundt bill prohibits discharge of new sources of pollution. American Mining Congress and other industrial witnesses will oppose these bills.

Premium Price Plan

The Russell (Rep., Nev.) bill, H. R. 2455, discussed in previous issues, has been given an open rule for House floor consideration and may be acted upon at an early date. The measure would extend until June 30, 1952, the Premium Price Plan for copper, lead and zinc, which would otherwise expire on June 30.

Government Fertilizer Program

Hearings are being held intermittently by the Senate Committee on Agriculture on a bill, S. 1251, designed to establish a Government fertilizer program. Sponsors of the measure are Senators Hickenlooper (Rep., Iowa), Wherry (Rep., Nebr.), Hill (Dem., Ala.), Capper (Rep., Kans.), Thye (Rep., Minn.), Stewart (Dem., Tenn.), Aiken (Rep., Vt.), Bushfield (Rep., S. Dak.), Young (Rep., N. Dak.), and Wilson (Rep., Iowa)—representing a majority of the Senate Agricultural Committee.

The bill would utilize raw material reserves of Florida and the West, provide for immediate construction of fertilizer plants and also establish a widespread test program for use of fertilizer in agriculture.

Title IV of the bill states that the "remaining reserves" of phosphate and potassic minerals in the public domain are essential to the public interest and shall be held by the Government as a public trust. It also provides that leases hereafter issued for extraction of phosphate and potassic minerals are to contain such terms, including provision for sale of a certain percentage of the production for use in the national fertilizer program, as the Secretary of the Interior determines to be in keeping with purposes of the proposed Act. When an area is declared a reserve under terms of the measure, existing leases within such an area are not subject to renewal.

On June 4 a number of well qualified raw material producers blasted the bill in an effective appearance before the committee. Among those testifying were Louis Ware, president, International Minerals & Chemical Corp.; C. T. Prindeville, vice president, Swift & Co.; B. W. Bellinger, general manager, U. S. Phosphoric Products Division, Tennessee Corp.; and Sam Simplot, a phosphate producer of Pocatello, Idaho.

Assuring the committee that the bill is not needed, Mr. Ware explained that his company is spending $7½ million in plant and equipment, sufficient to care for any present domestic and export demands for high analysis phosphate, and that their real concern is in the prospective market for their product. All the witnesses related facts covering heavy expenditures for plant and equipment and assured the committee of an ample supply of raw materials for fertilizer at a cost much less than the Government could expect to achieve.

President Horace M. Albright, of U. S. Potash Co., is scheduled to testify June 27 and is expected to address his statement, in large part, to the extremely dangerous provisions in Title IV, referred to above.

Mining in Navigable Streams

On June 2 the House passed the bill by Delegate Bartlett (Dem., Alaska), H. R. 174, which would permit exploration and mining for gold and other precious metals in the beds and on the shores of navigable streams. The measure now goes to the Senate Mines and Mining subcommittee of the Public Lands Committee, where Senator Cain (Rep., Wash.), who has introduced a companion bill, has arranged with Chairman Dworshak (Rep., Idaho) of the subcommittee for an early hearing.

"I hate to tell Zeke we just scrambled eggs in that pan."

MANUFACTURERS FORUM

Baker Announces New Mine Tractor

The Baker Industrial Truck Division of The Baker-Raulang Company announces a new permissible mine tractor of improved design which, when coupled to various types of trailers, hauls coal, supplies or personnel.

The tractor, which has U. S. Bureau of Mines approval, is designed so that the operator may work from either a seated or reclining position, depending upon the height of the seam in which the unit may be operating.

More than 12 years ago J. H. Fletcher conceived the idea of putting mining equipment on rubber tires so it might operate directly on the mine floor. The first of several pneumatic-tired installations went into service in mid-summer, 1936. These units consisted of Baker storage battery-powered mine tractors coupled to specially designed self-dumping trailers. Hauling coal from the loaders to mail line pit cars, these units were responsible for greatly increasing the tons-per-man resulting in lower cost-per-ton of coal mined.

Further information can be obtained from the sales representative, J. H. Fletcher & Company, McCormick Building, Chicago, Illinois.

Link-Belt Announces "CA" Concentric-Action Screen

A new vibrating system, to be known as the Link-Belt "CA" Concentric-Action Screen, is announced by Link-Belt Company as now being available, to meet a constantly-growing demand for economical and effective sizing of a large variety of materials.

The new "CA" Screen is an inclined floor-mounted or spring-and-cable suspended screen with an ingeniously balanced two-bearing vibrator mechanism which imparts a concentric or circular vibrating motion to all points of the screening surfaces.

The screen can be used for both medium and heavy duty sizing as well as for scalping and dewatering or rinsing operations.

It is made with double or triple decks and in sizes ranging from 3 x 8-ft. to 6 x 14-ft. Single-deck screens can be provided by merely removing the lower deck of the standard double-deck screen.

The advantages are enumerated as:

1. *High Capacity*: Greater amplitude at high speeds; unobstructed screening surface; true circle vibrating movement; controlled screen cloth tension.

2. *Smooth Operation*: Less abnormal vibration through critical ranges in starting and stopping; minimum starting torque; screen can be suspended by cables or mounted on floor.

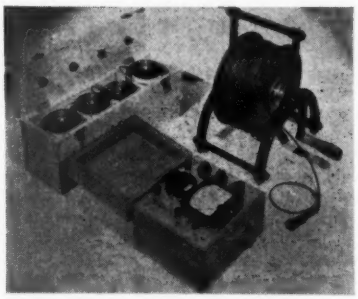
3. *Low Maintenance*: Easily serviced and inspected.

Installation photographs, sizes, dimensions and other data are given in a new 16-page Link-Belt Book No. 2154, a copy of which will be sent upon request to the company at 307 N. Michigan Ave., Chicago, Ill.

Self-Potential Apparatus

The Geophysical Instrument Company announces the development of a complete outfit for conducting prospecting and scientific investigations by the spontaneous polarization method.

For many years it has been recognized that certain ore bodies and certain geological formations act as a sort of "battery" and set up an electrical current in the earth. Pyrites and graphite are two instances of ore bodies which exhibit this effect. By making measurements over the surface of the earth according to



a predetermined plan at regularly spaced stations, it is possible to detect the presence of such ore bodies and determine their location.

The apparatus furnished by the Geophysical Instrument Company for this purpose consists of a light weight sturdy field potentiometer, a set of four non-polarizing electrodes with a special carrying case, the copper sulphate crystals required for the

Here's where they get the works. "They" are the giant earthmover tires, designed and manufactured in Akron, Ohio, by The Goodyear Tire & Rubber Company; "Here" is the proving ground of a large manufacturer of earthmoving machinery. The tires are built for use in the construction of highways, airports; for logging operations, and for stripping and handling ore and coal

non-polarizing electrodes, a light weight aluminum alloy cable reel equipped with 1,000 feet of high strength light weight field cable and the necessary connecting leads.

M.S.A. Ear Defenders Increase Efficiency

M. S. A. Ear Defenders, made by Mine Safety Appliances Company, provide a simple, inexpensive means of excluding excessive noise while permitting speech and warning signals to be heard—thereby increasing working efficiency and preventing fatigue caused by loud, distracting sounds.

The M. S. A. Ear Defender is essentially a tapered tube molded from a soft, non-toxic, elastomeric material with an inner septum for filtering harmful noises. A soft, resilient flange surrounds the Defender's inner end and provides comfortable fit and complete closure of the ear canal. Properly fitted, Defenders will reduce loudness of sound in noisy areas to about one-tenth the former level, enabling workers to concentrate on their jobs. An outer flange, shaped to conform to the lobe of the ear, prevents the Defender from entering the ear too far.

According to the manufacturers, M. S. A. Ear Defenders have been developed in accordance with established acoustical principles. They are said to be comfortable to wear, sanitary, and easy to insert and remove.

Bulletin No. HA-3 on M. S. A. Ear Defenders gives complete information and will be sent upon request to Mine Safety Appliances Company, Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

P&H 6-Yd. Electric Shovel Now Available with "Magnetorque" Drive

P&H "Magnetorque" hoist drive is now offered as standard equipment on their 6-yard electric shovels, according to announcement received from Harnischfeger Corporation.

This new principle of hoisting, which has proved so successful on other P&H electric shovels, simplifies the entire hoisting machinery including the power units. "Magnetorque" drive replaces the usual generator and DC motor with a simpler AC motor. Because of the nature of this drive, two concentric electric magnets with one rotating within the other, it is likened by the manufacturer to "fluid drive." The amount of torque to be transmitted is controlled through variable energizing of the magnetic field. Hoisting operations are therefore smoother.

Other advantages claimed for this type of control are: elimination of customary hoist generator and its maintenance, smooth Ward Leonard performance with faster plugging, a reduction in peak power demands and power costs. With P&H "Magnetorque" drive, the customary slip-friction hoist clutch is also eliminated, and shock loads are cushioned.

New ACF-built 12-ton drop bottom mine car—the largest mine car ever built for below surface mines. A number of these cars are being built by ACF for the Pardee and Curtin Lumber Company. Forty-two men are grouped in the car to give some idea of its relative size

Snow Heads Euclid Sales Development

The Euclid Road Machinery Co. to expand its services to distributors and customers has established a Sales Development Department, headed by V. L. Snow. This department will make field engineering studies for the improvement of current Euclid models and the development of new products. It will also prepare material for distributor's use in sales training programs for their personnel.

Mr. Snow, who is well known in the construction equipment industry, joined the engineering department of Euclid in 1935 and served as Assistant Chief Engineer until 1942. At that time he became Manager of Industrial Products, a position he has held until his recent promotion.

Announcements

C. L. Cummins, founder in 1919 of the **Cummins Engine Company, Inc.**, Columbus, Ind., was elected Chairman of the Board of Directors, and **J. I. Miller** was elected President of the company, at the 1947 annual meeting of stockholders and directors.

Mr. Miller came to the company in 1934 in the capacity of vice-president and general manager and has been with the company continuously since that time except for the years 1942-44, when he served as a commissioned officer in the U. S. Navy aboard the USS Langley.

Other officers elected by the board are: V. E. McMullen, executive vice-president; R. E. Huthsteiner, vice-president and general manager; H. L. Knudsen, vice-president of engineering; Carl R. Fox, vice-president and works manager; D. C. Bottorff, secretary and treasurer; R. E. Lay assistant secretary and assistant treasurer, and Edwin G. Crouch, assistant secretary.

* * *

A. H. Jones, well known for many years on the West Coast as manager of the **Gardner-Denver Company** branch office in Los Angeles, has been appointed director of the Export Office in New York City, according to an announcement made recently by Gardner-Denver officials. Mr. Jones was also elected vice-president of the newly formed Gardner-Denver Western Hemisphere Company with offices in New York.

* * *

Announcement is made by **American Car and Foundry Company** that **Justus W. Lehr** has been appointed district manager in charge of the ACF Berwick, Pennsylvania, plant succeeding Guy C. Beishline who recently resigned.

Before coming to ACF in 1940 he had been employed by the Pullman Co., Mt. Vernon Car Co., Curtis Bay Copper Iron Works of Baltimore, Md., and the Sanford Iron Works at Knoxville, Tenn. Since coming to ACF he has served as assistant district manager of the ACF Berwick, Pa., plant during the company's wartime expansion and was employed in that capacity until the time of his transfer as head of the ACF Chicago, Ill., plant in December, 1944.

Index To Advertisers

Holes Drilled 10 Times Faster!

It took 73 minutes to drill 5 blast holes in coal with steel bits. Kennametal Bits, in same hand-held drill, do the job in 7½ minutes!

Easier Work for Skilled Men!

Holes are drilled with less manual effort because Kennametal Bits hold their keen edge—drill to desired depth without pulling out for bit changes.

Power Consumption Cut 90%!

Drilling holes 10 times faster saves 90% of the power formerly used . . . and proportionately reduces wear and tear on the drilling machine.

KENTUCKY MINE IMPROVES COAL PRODUCTION 5 WAYS

Tonnage Per Shot Increased 50%!

Blast holes are now drilled 7½ feet deep with Kennametal Bits, instead of 5 feet, which was the practical limit of steel bits. 50% deeper holes . . . approximately 50% more coal per shot.

Production Balanced!

Capacity use of all underground equipment is more nearly approached, as delays due to slow drilling are avoided.

By using this revolutionary **KENNAMETAL** *Drill Bit*

The service results summarized above, as recorded in a Johnson County, Kentucky mine, are being obtained in scores of other mines. Here's why—Kennametal Bits drill with greater ease, at faster speed, because their cutting edges are Kennametal*, the tool metal that is far harder and more durable than the hardest steel. There's only one way to prove what they can do for you—try them now. Our mining engineer in your district will be glad to demonstrate. Write us, giving details of your operation.

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Cutting Edges are *KENNAMETAL

. . . the tough, exceptionally hard, amazingly durable metal that is used all over the world to reduce the cost of cutting steel, cast iron, nonferrous metals, rock, cement, tile, and many other materials!

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Fewer men can set up these lightweight Alcoa Aluminum supports—and save time and effort on the job. Alcoa supports will take a lot of punishment.

Alcoa Aluminum Structural Shapes last longer on the job. Highly resistant to corrosion, these aluminum beams are mineworthy and are not inflammable.

For working face roof supports in mines, tunnels and excavations, Alcoa Structural Shapes are an economical way to safe operation. Whatever your strength requirements, Alcoa engineers will help you choose suitable shapes. ALUMINUM COMPANY OF AMERICA, 1764 Gulf Building, Pittsburgh 19, Pennsylvania. Offices in leading cities.

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